

CIO

THE MAGAZINE FOR INFORMATION SUPERHEROES

JUNE 15, 1998

SECTION ONE
170 PAGES IN TWO SECTIONS

United States \$8
Belgium Bfr278
France Fr47
Germany DM14
Italy L13,300
Japan ¥965
Netherlands G16
Spain P1173
Switzerland SFr11
United Kingdom £5

ALSO INSIDE
Geoffrey Moore
Helps CIOs Play
The Gorilla Game

PAGE 52

Eye-T! Discovering Visual Data

JOIN THE INFONAUTS PAGE 41

WHAT MADE DELL THE #2 SUPPLIER OF PCs TO U.S. BUSINESSES?



Dell® OptiPlex®

At Southern Company, nothing's more important than fast response, reliability and cost efficiency. And when they asked, Dell answered by delivering systems that were so reliable, Southern Company switched their installed base, saving them millions on their bottom line. So what makes Dell® computers so reliable? Each one is custom-built to the customer's exact specifications. With components that are industry standard, not proprietary, helping to ensure compatibility. And they're supported by award-winning, around-the-clock, seven-days-a-week telephone and online service.



**ASK SOUTHERN COMPANY, THE ENERGY
COMPANY 12 MILLION PEOPLE COUNT ON
TO BE THERE AFTER THE STORM.**

You see, at Dell we don't just sell directly to customers. We listen directly to them. Establishing both a genuine relationship with our customers, as well as accountability to them. Thus making us the number two supplier of PCs to U.S. businesses[†] according to the latest IDC results. The fact is, Dell is built from the ground up to answer the needs of business. So let us ask you a question.

What can we build for your company? Call us at 1-800-900-DELL or visit us at www.dell.com.

DELL[®]
www.dell.com

[†]IDC Quarterly PC Market Tracker, Q4 1997, total PC shipments to U.S. businesses. Future results may vary. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. Not all products in the OptiPlex line contain a Pentium II processor. ©1998 Dell Computer Corporation. All rights reserved.



**There are 2,600,000 IT professionals out there and
14,819,756,871 daily problems to solve.**

Obviously, something's got to give.

**It's fairly obvious that the role of the IT person has changed considerably
in the past few years.**

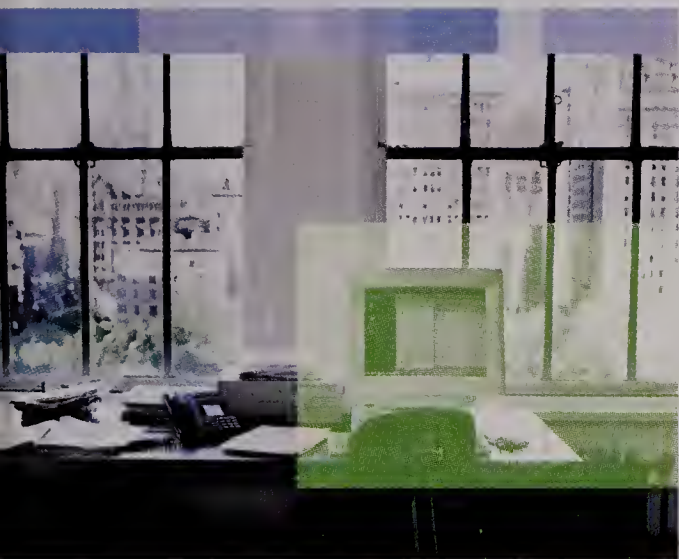
**In most cases, it's gone from policeman to fireman, from telling people
what they can and can't have, to putting out fires caused by all the stuff
they went and got anyway.**

**One way to make things simpler is to have key parts of your system
integrated.**

**Not surprisingly, this is one of the biggest advantages of our software.
We built Microsoft® Windows®, Office®, BackOffice® and Visual Studio™ from
the ground up to work together in the same familiar way.**

**More integration = fewer problems, which means you'll have the time to
focus on more strategic issues like building a system that meets the
unique and dynamic needs of your company.**

We call this kind of system a Digital_Nervous_System.



A Digital_Nervous_System relies on distributed PCs and integrated software to make information flow more rich, rapid and accurate.

It helps organizations act faster and make more informed decisions.

It helps users focus on the task, not the technology.

It helps you go from fireman to architect.

Windows, Office, BackOffice and Visual Studio provide an ideal foundation for your Digital_Nervous_System because they're integrated. They also work with an industry's worth of applications, so incorporating new software solutions is easier. Taking advantage of hardware advances is easier. Integrating Internet capabilities is easier.

Of course, none of this will help you sleep better at night.

You'll just lie awake thinking of more important things.

Where do you want to go today?®

Microsoft®

www.microsoft.com/digital_nervous_system/

Features

41 See It!

COVER STORY: KNOWLEDGE MANAGEMENT
Will data visualization be the tool that relieves information glut for business?

By Tom Field

52 The Gorilla Game for CIOs

STRATEGIC PLANNING Bargain with kings and princes, but after you've blustered and bluffed, never, never dicker with a gorilla. The beast just might hold the key to your IT planning.

By Geoffrey Moore

56 Sell Yourself

INTERNAL MARKETING You may have a terrific service organization, but if you are missing a marketing plan, how will anyone else know just how much your IS group can do?

By Claire Tristram

64 It's Not Just for Meetings Anymore

VIDEOCONFERENCING Videoconferencing can save you a few bucks on airline tickets, but do you know how to use this technology to enhance business functions?

By Mark Halper

ON THE COVER:

Join **Doc Data** and the **Infonauts** as they discover innovative solutions to the information glut.

Cover illustration by The Dynamic Duo



Objects *r* Here.

The future belongs to objects.

Jasmine™ is the future of objects.

It's the first complete and pure object solution.

It's not a hybrid. It's not hype.

Jasmine is real. A proven, complete object-oriented database and development environment. So now you can build the next generation of multimedia business applications and run them everywhere: client/server, Internet, intranet, and extranet.

Introducing The Industry's First Multimedia, Internet-Enabled Object Database.

With built-in multimedia and Internet support, Jasmine has it all. A pure, object-oriented database. Drag-and-drop development environment. Distributed object delivery. Efficient database multimedia storage and manipulation, and efficient delivery through streaming and caching. The industry's easiest development environment lets you use all your favorite tools: built-in VB integration, native Java support, and C++ support.

Unlike hybrid or partial object solutions, Jasmine actually works.

So you can shorten your time to market and gain a distinct competitive advantage.

If that sounds good, pick up the phone right now. Because Jasmine is ready today.

Are you?

**Call 1-888-7 JASMINE for your FREE Developer Edition CD
or visit www.cai.com**



Introducing Jasmine™ Objects @ Work™

**COMPUTER
ASSOCIATES®**
Software superior by design.

©1998 Computer Associates International, Inc., Armonk, NY 11704-2099.
All other product names referenced herein are trademarks of their respective companies.



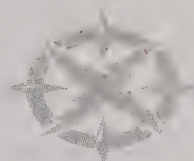
I'm a simple man.

{ I like art, unusual jewelry and
reading your confidential files. }

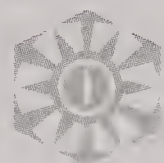
SCARY THING IS THIS GUY IS NOT ALONE. LOTS OF PEOPLE WOULD LOVE NOTHING MORE
80% OF THE FORTUNE 100 HAVE CHOSEN NETWORK ASSOCIATES FOR THEIR NETWORK
1-800-332-9966, DEPT. 5538, OR VISIT WWW.NAI.COM. BUT CONTACT US SOON, BECAUSE



N
e
t
T
o
o
l
s



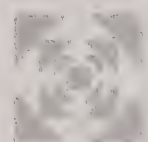
McAfee Total Virus Defense



PGP Total Network Security



Sniffer Total Network Visibility



McAfee Total Service Desk

THAN TO MESS WITH YOUR NETWORK. FORTUNATELY, YOU ARE NOT ALONE EITHER. OVER
SECURITY AND MANAGEMENT. TO FIND OUT MORE, CALL
HIS TONGUE ISN'T THE ONLY THING HE WANTS TO PIERCE.

 **network**
ASSOCIATES
Who's watching your network

Columns

32 Safe Exits

EXECUTIVE COUNSEL When you fire an IS staffer, make sure your company won't get burned. *By Peter Fabris*

38 Lights! Camera! Apps!

FORRESTER VIEW Online commerce is changing application development teams so that they operate more like—of all things—movie crews. *By Ted Schadler*

72 Moving Pictures Go to Work

EMERGING TECHNOLOGY Video-on-demand is becoming easier to request. *By Dan Sweeney*
Biometrics follow-up • Windows NT security • Y2K across the LAN • Smart cards go wireless • Call center workflow

80 Moving Lessons

FIRST PERSON A former CIO looks back at life during a corporate relocation. *By Albert E. Dietrich III*

86 Pioneer Natural Resources' Simulation Technology

WORKING SMART An oil and gas company performs what-if simulation to test the variables associated with managing business operations. *By Howard Baldwin*

In Every Issue

12 In Box

Letter from the editor, reader feedback and how to reach us
• New on our Web site

16 Publisher's Note

20 Trendlines

Time Marches On • Capital Improvements, Online • Off the Shelf • R2-D2, MD • Pod People

84 Index



Inside Section 2

COVER STORY: THE GLOBAL ENTERPRISE The IT hazards you face in emerging markets can leave you with a global headache.

RISK MANAGEMENT Although you can't eliminate risks, there are ways to ensure you're taking intelligent ones.

MANAGEMENT TRENDS Should you hire a high-powered consultant or a really good shrink to combat poor communication?

I.T. AND FINANCE A new survey outlines the top IT issues for finance executives.

REALITY BYTES Two cheers for team-based management.

INTELLECTUAL CAPITALISM Savvy entrepreneurs have proved knowledge management's value time and again.

CHECKS & BALANCES Applying some basic principles of finance to your IT investments will help you better manage these risky ventures.

LEARNING CURVE There's no breakthrough technology behind the NC—but it's attracting a lot of attention.



Board Chairman PATRICK J. MCGOVERN

President KELLY CONLIN

Chief Operating Officer JAMES CASELLA

If you had Oracle

Financial and Manufacturing

Applications to help

you achieve \$7 billion in sales,

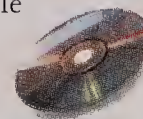
you'd be smiling, too.



©1998 Oracle Corporation. All rights reserved. Oracle and Enabling the Information Age are registered trademarks of Oracle Corporation.
 ®*Kellogg Company. ©1998 Kellogg Company

Oracle and Kellogg's®
satisfying customers worldwide.

A corporation that wants to grow needs a healthy diet. And a key ingredient for Kellogg Company is a flexible Oracle solution, one that realigns and consolidates its global information system. Using a robust, integrated set of Oracle Financial and Manufacturing Applications, Kellogg is streamlining its operations worldwide, and thereby approaching \$7 billion in sales. In addition to keeping a worldwide staff on top of all the latest information, Oracle decision support and data analysis tools give management a greater ability to make strategic decisions. And with the powerful Oracle database as its information management backbone, Kellogg can be assured that its systems will always be reliable, available and scalable. Kellogg is using Oracle's global solutions to seamlessly and synergistically work with suppliers, partners and customers in over 160 countries. Now the supply chain, manufacturing and financial processes are organized under strict control, positioning Kellogg at the forefront of the Consumer Packaged Goods Industry. With its best-of-breed partners, Oracle is providing superior consumer packaged goods solutions, helping companies grow locally and globally. Find out more about how Oracle can help your business grow, by visiting www.oracle.com/info/3 or calling 1-800-633-0750, ext. 12963 for a free CD.



ORACLE®
 Enabling the Information Age®

The IT Group

Who we are.

Visionaries.

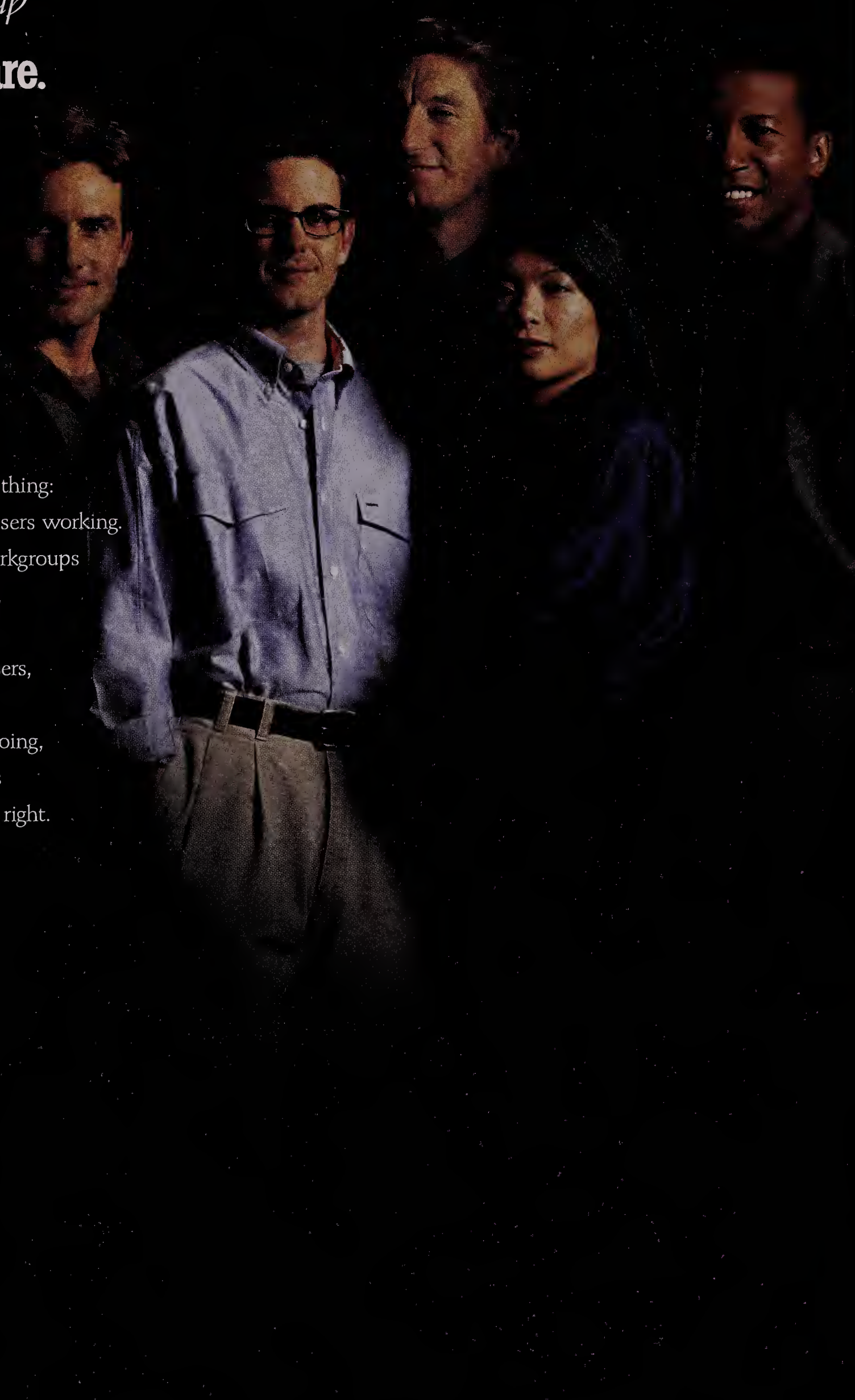
Agents of change.

Engineers.

Teachers.

Troubleshooters.

We do everything,
to accomplish one thing:
we keep our end users working.
From tight-knit workgroups
to global networks,
from novice clerks
to expert power users,
we are the ones
who keep things going,
so we are the ones
who have to get it right.



What we want.

Platform consistency.
Industry-leading components.
Expert support.

We need suppliers who can help us build the most stable of networks. Who are able to put together any kind of hardware or software we ask for. Who, as a matter of course, provide experienced support people at

any hour, day or night, and easy access to their top system engineers. We don't need vendors who try to push through off-the-shelf solutions – what we want, and what we need, are vendors who can do things *our way*.

Isn't it great when you can meet your wants and needs at the same time?

E-4200 High-Performance Network-Ready Desktop

- Intel Pentium® II Processor
Prices Starting at \$2499

NS-9000 Enterprise Class Server

- Up to Six Intel Pentium Pro Processors
Prices Starting at \$11,599

Solo® 2300 Value Class Notebook

- Intel Pentium Processor with MMX™ Technology
Prices Starting at \$1999

E-5000 Technical Workstation

- Up to Two Intel Pentium II Processors
Prices Starting at \$3599

At Gateway Major Accounts, we listen. We learn. Our whole business is built on giving our clients unique, customized solutions. In short, we do things your way. Please get in touch, and we'll be glad to show you what that means.



"YOU'VE GOT A FRIEND IN THE BUSINESS"®

CALL 1-888-888-0260 www.gateway.com

Gateway 2000 Major Accounts, Inc.



©1998 Gateway 2000, Inc. All rights reserved. The Intel Inside Logo, Intel and Pentium are registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. Many Gateway products are custom engineered to Gateway specifications, which may vary from the retail versions of the software and/or hardware in functionality, performance, or compatibility. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping and handling or any applicable taxes. Gateway 2000 Major Accounts, Inc. is a wholly owned subsidiary of Gateway 2000, Inc. Call us for a free copy of our limited warranty. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you.

In Box

LETTER FROM THE EDITOR, READER FEEDBACK
AND HOW TO REACH US

Scope creep. Sounds like something they'd advertise a cure for on the local cable channel.

My husband and I just bought a new house, and we are experiencing scope creep. We're putting in a new kitchen, among other things. What's there is too small for our family of four, and it doesn't have the kind of equipment we prefer. My husband has building experience, so he will oversee the job and do some of the work himself. We've got a budget, and we're pretty sure we can cover everything we want to do.

Sounds a lot like the way most IS projects start out. Well, what's happening now also mirrors what happens in a lot of IS projects. You see, this house has an oil furnace, with propane to heat the pool. Our initial plan was to hook up the gas range to the propane. But the propane hasn't been used in about five years, so the tanks and lines need a full check-up before we can use them, and we need to run a pipe across from where the tanks are to where the kitchen is—on the opposite side of the house (I'm not loving this idea). This will

cost \$500 or \$600—if we don't need to replace the tanks. Fine. The alternative is to install natural gas, but that costs about \$1,500.

This is where the scope creep comes in. It turns out that we can get free installation of a natural gas line if we convert our furnace to gas. The oil burner has rust on it, and it's been there for almost 20 years. It's bound to go sometime soon anyway, right? Well, a new furnace is some \$2,500 of unbudgeted money. But we'd be saving \$1,500 on the installation, so it's like getting it for less than half-price (I know this is screwy logic, but this is how we think).

If cost and waste were not an issue (right now the furnace works fine, and we've got a tankful of oil), this wouldn't be a difficult decision. But there are always trade-offs. IS executives often succumb to pressure from business users to add more features and functionality without pushing back hard enough. Corporations have lots of money. That doesn't mean you have to spend it.

There's a lot to be said for waiting. Who knows what new technology will be available in a year or two that you won't be able to invest in if you act now. If what you've got will do the job, maybe you should make do.

So if we can find a way to safely get the propane to the kitchen, I think that's what we'll do. We can get a new furnace in a couple of years and convert to gas then if that still seems like the best choice. In the meantime, we've got two fireplaces and a wood stove, so we've even got a contingency plan.

Of course, our kitchen project pales in comparison to your multimillion-dollar technology projects. I'll bet you've got some great stories to tell. So what's your worst experience with scope creep? Send e-mail to the address below.

Abbie Lundberg

Abbie Lundberg
lundberg@cio.com



© CIO Communications, Inc.

President, CEO and Group Publisher Joseph L. Levy
Publisher Gary J. Beach
Editorial Director Lew McCreary

EDITORIAL

Editor in Chief Abbie Lundberg
Executive Editor Richard Pastore
Managing Editor Anne Stuart
Senior Editors Howard Baldwin (West Coast),
Alice Dragoon, Carol Hildebrand,
Art Jahnke, Christopher Koch
Features Editors Elaine M. Cummings,
Todd Datz, Perry Glasser, Sandy Kendall, Katherine Noyes,
Megan Santosus (Web & Print), Sara Shay
Copy Chief Cheryl R. Asselin
Copy Editors Meg Mitchell, Sheila Neylon,
Thomas G. Wailgum
Senior Writers Gary Abramson, Mindy Blodgett,
Jennifer Bresnahan (Web & Print), Peter Fabris,
Tom Field, Sari Kalin, David Pearson, Derek Slater
Editorial Researcher Carol Zarrow
Editorial Assistants Ruth Greenberg, Lynne Zouranjian
Editorial Operations Manager Lisa Jayne Kerber
Contributing Editor Martha Ulfelder
Contributing Writers Albert E. Dietrich III,
Leonard M. Fuld, Mark Halper, Douglas Hubbard,
Geoffrey Moore, Lauren Gibbons Pauli, Ted Schadler,
Dan Sweeney, Claire Tristram

DESIGN

Group Director, Art and Design Mary Lester
Art Director Lisa Munroe
Associate Art Director Michael Siggins
Sr. Graphic Designers Hana Barker, Steve Traynor
Graphic Designers Terri Haas, Terri Mitchell
Associate Graphic Designers Robin M. Beiliveau,
Jessica L. Sepe

WEB SITE

VP / Technology and Webmaster Tim Horgan
Web Editor Stephen L. Singer
Web Developers Dagmar Eiben, Lee Weiner
Web Researcher Kathleen Kotwica

CIRCULATION

VP / Circulation Carol A. Spach
Circulation Manager Susan Woodworth
Subscription Svcs. Manager Denise Perreault
Circulation Coordinator Tina Pescara

PRODUCTION

VP / Production Lori Beth Sadewitz
Senior Production Manager Resa Altsher
Ad Traffic Coordinator Lee Tuttle

EXECUTIVE PROGRAMS

Senior VP / Exec. Programs Lynda Rosenthal
Director, Program Planning Susan T. Montgomery
Director, Programs / Event Development Robin L. Azar
Assistant Program Manager Thomas M. Pitkin
Manager, Program Operations Cynthia Laird
Mgr., Program Mktg. Comm. Sara A. Evangelous
Technical Admin. Specialist Liz Hecht
Program Mktg. Specialist Jeremy E. Draper
Administrator, Program Planning & Finance Sandra J. Hughey
Fulfillment Manager Brian Fuce
Administrators, Exec. Programs Heather Beaton,
Michael McPhee
Manager, Ancillary Products Bill Kerber

MARKETING

VP / Marketing Cathy O'Leary Hayes
Online Marketing Director Lisa Brown
Research Director Bridget Cammarata
Marketing Comm. Director Marcy L. Dill
Public Relations Director Susan Watson
Cust. Service Rep./ConsultWare Dot Caspersen
Research Associate Caroline Cerullo
Publicist Karen Fogerty
Marketing Comm. Specialist Lisa Wilson-Wirth

ADMINISTRATION

VP / Finance & Admin. Walter Manninen
Assistant to the Publisher Diane Martin
Office Specialist Cara Kelley
Billing Supervisor Lynn J. Palmquist
Financial Analyst Kerry Grady

INFORMATION SYSTEMS

IS Director David Woodali
Manager, Network Services James C. Burgoyne
Manager, Desktop Services Louise Pelletier
IS Specialist Katy Tynan

PHOTO BY WEBB CHAPPELL

**Unisys enterprise-class solutions for Windows NT®
are built to withstand anything.
Go ahead, just try and knock them down.**



Unisys-deployed Microsoft® Windows NT systems are virtually fail-safe. So they're the perfect solution for mission-critical operations such as a 911 dispatch system. Unisys enterprise-class servers feature redundant hardware, intelligent error handling, and a choice of clustering solutions. And our expertise in creating and supplying enterprise-class NT solutions remains exceptional. That's why Microsoft has teamed up with Unisys to create the Unisys/Microsoft Enterprise Partnership—an alliance designed to help customers capitalize on NT as an anchor for highly robust solutions. Stop by our Web site to find out more.

UNISYS

www.unisys.com/ent

In Box

AIRLINE TECHNOLOGY

As the CIO of American Airlines, I was chagrined to see Tom Davenport using our automated boarding-pass readers as an example of the inappropriate application of technology and disappointed to learn that Southwest Airlines' colored and numbered plastic cards are the answer ["Cheap Is Beautiful," CIO Section 1, March 1, 1998].

Now, I happen to agree with much of what Mr. Davenport says in the article—and I would certainly never quarrel publicly with an American AAdvantage Executive Platinum member—but I believe both the example and the contrast with Southwest are slightly off the mark. First, Mr. Davenport was right in "trusting that the IT prowess of American wouldn't let [him] down." The technology worked fine, but on that occasion, the man/machine interface failed. Yes, I know we need to concern ourselves with the human factors and build people-proof systems, and we will keep trying. But in my view, the moral of his story is on the human factors side and is not a case of "Pentium envy."

Second, Southwest runs a great airline, but it does not compete with American in many of our markets, nor is it a match for our product offering in many others. We flew Mr. Davenport from Austin to New York's La Guardia Airport in about five hours, in seats he reserved, with boarding passes and security clearance

for both flights that he had before he left Austin, and we even fed him (a nontrivial task of nontrivial value, since he probably left his office around 2:30 p.m. and arrived at his New York hotel after 10 p.m.). Most important, his flight from Austin had passengers bound for 38 different destinations, most of which—such as Paris, Boston, Toronto and of course La Guardia—Southwest doesn't serve. We'd love to have the simplicity of a single fleet of 737s and colored plastic boarding cards, but then we couldn't fly many of our flights, and many of the rest would be sadly lacking in paying passengers, who would have to settle for peanuts on their jaunts cross-country.

I agree that cheap is beautiful and simplicity is splendid. But the logistics of a large, international airline are complex; automated boarding-pass readers have succeeded in resolving the vast majority of "seat dupes" or other problems in the terminal, where they can be better handled, instead of in the aisle of a 757. They have also been instrumental in reducing the frantic activity in the last minutes before departure, improving the standby passengers' experience and improving our on-time departure performance.

Scott D. Nason

Vice President and CIO

American Airlines Inc.

Fort Worth, Texas

scott_nason@amrcorp.com

IMPAIRED HEARINGS

Joseph Levy's opinion piece in CIO Section 2, March 1, 1998, was shortsighted at best, and at worst, absolutely scary. To force users to search for and install software already on a PC is ludicrous. To force users to buy or download 10 percent of a piece of software when 90 percent is already on the piece is even more ridiculous. These hearings have become a personal matter between Janet Reno and Anne Bingaman on one side and Bill Gates and Microsoft on the other, and should be stopped immediately.

Charles H. Trepper

CEO

The Trepper Group

Minnetonka, Minn.

chuck.trepper@damark.com

How to Reach Us

E-mail: letters@cio.com

Phone: 508 872-0080

Fax: 508 879-7784

Address: CIO Communications Inc.,
492 Old Connecticut Path, P.O. Box 9208,
Framingham, MA 01701-9208

Web Site: www.cio.com

Subscriber Services: 800 788-4605;

Fax: 508 879-7899;

E-mail: denisep@cio.com

Reprints: Reprints are available by
calling 508 935-4539.

Letters may be edited for length or clarity.

New On Our Web Site

cio.com

<http://www.cio.com>

NEW!

ONLINE QUICK POLL

Visit the CIO Online Quick Poll, which presents a new question every week. Post your opinion and see what your fellow CIOs have to say about today's hot topics.

www.cio.com/poll

KNOWLEDGE MANAGEMENT RESEARCH CENTER

Learn best practices for the capture, analysis, dissemination and archiving of information into knowledge.

www.cio.com/forums/knowledge

REMOTE COMPUTING RESEARCH CENTER

Whether you take it on the road or work from home, you'll find new strategies to make telecommuting easier.

www.cio.com/forums/remote

MOVERS AND SHAKERS

Find out about recent job changes and promotions in the IT industry.

www.cio.com/cio/movers.html

CIO RADIO

A new Web site feature! Listen to influential executives discuss today's hottest IT topics with CIO writers.

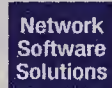
www.cio.com/radio

DOING BUSINESS ON THE INTERNET?

Is your patchwork security system keeping you up at night? Sun™ network

security software solutions offer rock-solid, end-to-end security that seamlessly

blankets your entire enterprise network. So you'll have the confidence to take



full advantage of doing business on the Internet. What's more, you're covered



by Sun's consulting, education and support services. For proven, flexible

security solutions, visit our Web site at www.sun.com/security/ or call us at

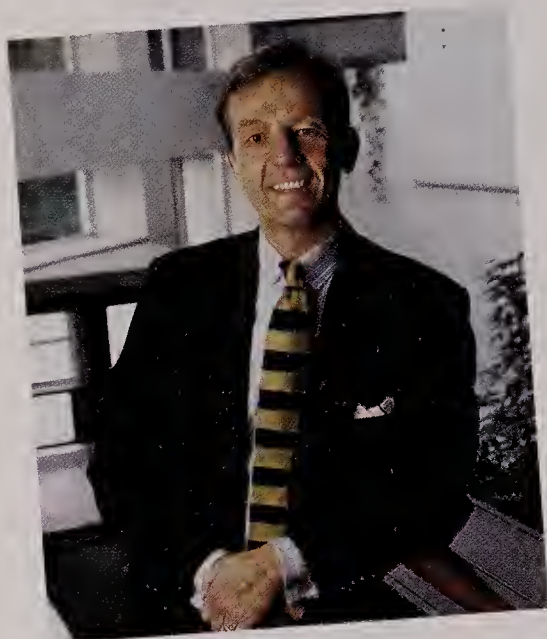
800-786-7638. And put your worries to bed. THE NETWORK IS THE COMPUTER.™

THE BEST SECURITY BLANKET IS BLANKET SECURITY.

Publisher's Note

The year 2000 safety net for the telecommunications industry—our nation's backbone for voice, data and Internet transmission—is nonexistent, will never be built and, as such, presents the global economy with its most significant year 2000 challenge.

The U.S. telecommunications industry is certainly one of the most competitive industries in America. Long-distance carriers. Regional Bell operating companies.



Internet service providers. Competitive local exchange carriers. Local exchange carriers. Internet telephony vendors. They compete fiercely with each other. Yet they intrinsically need each other to service and complete your company's voice and data transmissions.

How is this interdependent industry preparing for the year 2000 challenge? Are the providers wearing their competitive or their cooperative faces? Recent conversations with senior executives of major companies in the telecommunications industry convince me they are bringing their competitive faces to the year 2000 issue. This is very bad news.

"We have about 75 million lines of code to convert, so we will be OK," a long-distance carrier exec told me. "But we are concerned that our competitor with 800 million lines of code to convert will not be year 2000 compliant," he continues, his smile betraying his "concern."

When asked directly if he is aware of any industry efforts come to ensure seamless operation of America's telephone network on Jan. 1, 2000, the CEO of a regional Bell operating company lowered his head and flatly answered, "No, I am not."

You, the CIOs of America's largest corporations, are the only group with the collective power to force the telecommunications industry to work together on this issue. But you must act quickly.

Call your telecommunications managers and direct them to bring to your office representatives of the long-distance carriers, RBOCs, ISPs and others that service you. At the meeting, put these vendors on written notice, saying you expect them to cooperate to develop in writing a year 2000 compliance statement ensuring your company's voice and data traffic will work on Jan 1, 2000. If you really want to turn up the heat, demand a letter from their CEOs stating that their network will be year 2000 compliant.

No statement of compliance? No letter from the CEO? No future business from your company. OK, so the idea is a bit radical. But I am convinced only an uprising from major customers will get the telecommunications industry to work together on this issue.

Make that call now. There's not much time left.

Gary J. Beach
gary_beach@cio.com

CIO SALES OFFICES

President, CEO and Group Publisher
JOSEPH L. LEVY
508 935-4601

Publisher
GARY J. BEACH
508 935-4202

Senior VP/Sales
MICHAEL J. MASTERS
973 244-5500, Ext. 21

EAST COAST

Regional Director / Advertising Sales
FRANK S. GENOVESE
973 244-5500, Ext. 19

Regional Managers / Advertising Sales
EILEEN P. LOBAUGH
973 244-5500, Ext. 18
KATHY POWERS
973 244-5500, Ext. 14

Advertising Sales Associates

STACY G. GREIMEL
973 244-5500, Ext. 16
JOAN BONADEC
973 244-5500, Ext. 17
ANGELA FUNG
973 244-5500, FAX 973 227-1565

NEW ENGLAND

Regional Manager / Advertising Sales
LEN GANZ
508 935-4039

Advertising Sales Associate

STEPHANIE ROY
508 935-4092, FAX 508 872-0618

SOUTH CENTRAL

Regional Manager / Advertising Sales
ROBERT E. SAWDON

Advertising Sales Associate

SOUNTHALY OUTHAVONG
512 306-9801, FAX 512 306-9805

NORTH CENTRAL

Regional Manager / Advertising Sales
KEITH H. KENNER

Advertising Sales Associate

ANNE SWARTZ
847 441-5005, FAX 847 441-5150

WEST COAST

Regional Director / Advertising Sales
RICHARD BASTAS
415 693-1988

Regional Managers / Advertising Sales

JAMES BARRETT
415 693-1995
PAULA J. CONNOR
415 693-5634

Advertising Sales Associates

TIM LEONARD
415 693-5630
ALLISON WITTER
415 398-8200, FAX 415 398-4649

SOUTHERN CALIFORNIA

Regional Manager / Advertising Sales
NANCY A. COY

Advertising Sales Associate

JANIS WIKANDER
714 475-5579, FAX 714 475-5583

LIST SERVICES

List Services Manager

KATHRYN A.W. GRAYSON
508 935-4072

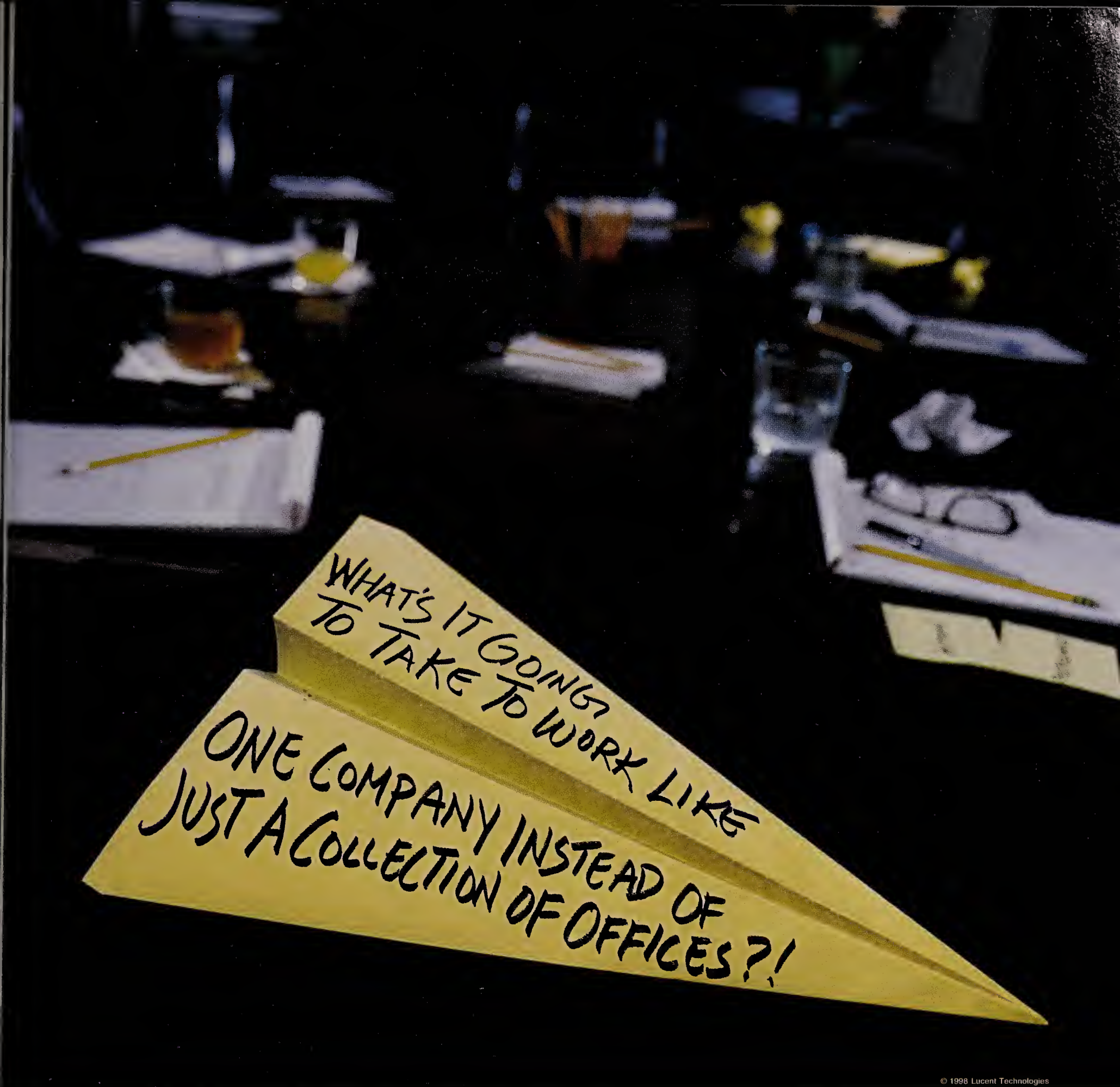
List Services Coordinator

AMY McCABE
508 935-4151
800 859-5478, FAX 508 872-8506

For further sales information,

visit our Web site at

www.cio.com/marketing/salesoffices.html.



WHAT'S IT GOING
TO TAKE TO WORK LIKE
ONE COMPANY INSTEAD OF
JUST A COLLECTION OF OFFICES?!

© 1998 Lucent Technologies

LUCENT DEFINITY® ECS

The more locations your company has, the more challenging the question: How can people easily share information, ideas and resources at the same time, even if they're not in the same place? That's why DEFINITY ECS continues to evolve. Not only does it integrate voice, data and video, but new enhancements allow your employees, as well as vendors, to share and modify information in real time. No matter where they are or what network they're using. This means increased productivity. And bottom line results. Backed by Bell Labs, DEFINITY ECS gives you assured reliability. It's also flexible enough to suit your needs now and in the future. And, of course, it's Year 2000 compliant. Plus, we'll be there all along the way to keep it performing optimally for you. In order to find out more about DEFINITY ECS, call your local Lucent representative or 1-800-221-1223, and ask for extension 353. **We make the things that make communications work.™**

Lucent Technologies
Bell Labs Innovations

211 Mt. Airy Road
Basking Ridge, NJ 07920
<http://www.lucent.com>
1-800-221-1223 ext. 353



unix = bull's-eye

You'll find UNIX® systems at the center of mission-critical computing.
In particular, the HP 9000 V-Class Enterprise Servers with HP-UX 11.0 UNIX

UNIX is a registered trademark of The Open Group in the U.S. and other countries. ©1998 Hewlett-Packard Company



unix = hp

systems allow you to reach critical business decisions. And they provide the robustness to keep you right on target. For more info: www.hp.com/go/unix.



Trendlines

NEWS, INSIGHT, HUMOR, REVIEWS

Edited by Sara Shay

Time Marches On

WEARABLE COMPUTERS Just when you thought laptops couldn't get any slimmer, here comes an invention that will make your sliver of a computer feel like an anvil. The 67-gram Ruputer, which goes on sale this month in Japan (no word yet on when it will be available stateside), downloads text, photos and other applications from PCs and transmits data via infrared rays, all from the comfort of your wrist. Wearers input information on the LCD watch face, which doubles as a miniature keyboard. They can also play games, store names and addresses, and keep track of appointments. Developed by Seiko Instruments Inc., the Ruputer has a 16-bit CPU, 128KB of RAM and 512KB of ROM. And it even tells time! ■



Capital Improvements, Online

WIRED CONGRESS After the 1994 congressional elections, newly minted House Speaker Newt Gingrich pledged to use the Internet to make the workings of Congress easily accessible to all citizens. Since then, nearly every senator and more than 360 representatives have Web sites, and many correspond with constituents via e-mail. In addition, the Congressional Record and Thomas, a searchable database that's a joint effort of Congress and the Library of Congress, provide committee reports, conference reports and the texts of some bills online.

But critics charge that Congress hasn't done enough to fulfill Gingrich's promise. Most personal congressional Web sites are nothing more than electronic campaign brochures, says Gary Ruskin, director of the Congressional Accountability Project, a watchdog organization affiliated with Ralph Nader. "You see a lot of news releases, recipes for corn bread and clam chowder, pictures of their dogs," Ruskin says. "Who cares? I think citizens just want to read about the work of the federal government."

Ruskin concedes that there are exceptions. Sen. John McCain (R-Ariz.), for instance, cleverly takes on government waste on his home page (www.senate.gov/~mccain/). An animated pig walks across the screen pushing a barrel of cash with his snout and dragging a sign that reads "Pork Barreling." Click on the sow and you jump to a long list of bills McCain considers to be pork.

But more troubling to Ruskin than the proliferation of what he calls "froufrou" sites is that many important congressional documents, such as the full texts of bills and amendments, rarely make it onto the Internet because in many cases committee chairmen won't allow it. Washington lobbyists have access to relevant drafts of bills through propri-



©1998, Amdahl Corporation. Amdahl is a registered trademark and Millennium™, TDMF and "Not just big computers. Big computing." are trademarks of Amdahl Corporation. S/390 is a registered trademark of IBM Corporation. All other trademarks and product names are the property of their respective owners.

THE PRIDE *is* BACK

AMDAHL PROUDLY RE-INTRODUCES RAW POWER.

- The Amdahl Millennium™ 700 Series are the most powerful CMOS servers in the universe. This year. Next year. Every year.
- Amdahl TDMF™ data migration software does the world's fastest S/390 data migration - and makes it transparent. Amdahl Operational Services makes it happen.
- Talk to Amdahl. The pride is back.

NOT JUST BIG COMPUTERS **AMDAHL®** BIG COMPUTING™

(800) 223-2215 ext. cio10 or www.amdahl.com/cio

Amdahl is a proud member of the Fujitsu family of high technology companies.

Trendlines

etary paid services such as Legi-Slate Inc., owned by The Washington Post Co., or Congressional Quarterly Inc.'s online service, but the citizens back home often have access only to outdated print documents.

Andy Sherman, director of congressional, legislative and public affairs for the U.S. Government Printing Office (GPO), says keeping the sites current is a challenge in part because of the sheer volume of documents Congress generates. "We print 400,000 to 500,000 pages of hearings testimony alone each year," Sherman says. Preparing documents for the Internet takes time because less than half of the material the printing office handles arrives there in digital format; Congress sends the rest as camera-ready copies. "We can put up image files of them on the Web, but they are not searchable," Sherman says.

Both the House and Senate are slowly upgrading their IT to support 100 percent electronic document capability, Sherman says, but that raises a thorny issue. Part of the GPO's mission is to create documents that can be preserved for posterity, but if government documents are preserved only electronically, future Hillsters and historians may not be able to read them. "Try to read a WordPerfect 3.0 document today," Sherman says.

Still, Capitol Hill is continuing to step gingerly into the digital age. For instance, McCain and some of his colleagues are sponsoring legislation to require that all Congressional Research Service reports that are not confidential be posted on the Internet. Ruskin applauds this move. "This is some of the best research the federal government does on everything from Amtrak to Zambia," he says.

—Peter Fabris

Off the Shelf

Strategic Planning Roundup

The Smart Organization:

Creating Value Through Strategic R&D

David Matheson and Jim Matheson
Harvard Business School Press, 1998,
\$29.95

The Profit Zone: How Strategic Business Design Will Lead You to Tomorrow's Profits

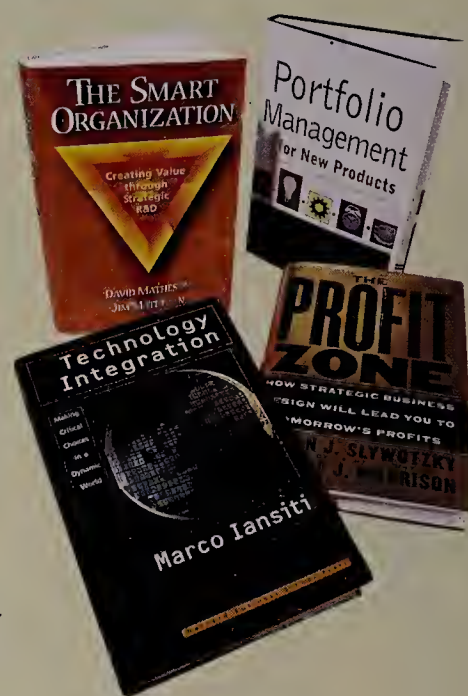
Adrian J. Slywotzky and David J. Morrison with Bob Andelman
Times Business, 1997, \$25

Technology Integration: Making Critical Choices in a Dynamic World

Marco Iansiti
Harvard Business School Press, 1998, \$35

Portfolio Management for New Products

Robert G. Cooper, Scott J. Edgett and Elko J. Kleinschmidt
Addison Wesley Longman, 1998, \$38



TWENTY-ODD YEARS AGO, A COLD WIND from the Far East battered U.S. businesses. After the storm, companies looked around at the destruction and found salvation in strategic planning. Taken together, these four titles offer approaches that might help executives avoid the next corporate cyclone.

The Mathesons' book has a telling dedication: "To our clients, who have taught us so much." At the heart of their work are nine principles that define smart organizations. Perhaps most useful are the detailed charts describing how strategic principles are applied in smart and not-so-smart organizations. These characterizations will help most readers determine where their companies fall on the smart scale.

Of particular interest in *The Profit Zone* are the personality profiles: Each celebrity manager illustrates a tactic. Andrew Grove of Intel Corp. learned how to manage compressed cycle times and a high rate of technical innovation. Microsoft Corp.'s Bill "Get the customers first, deliver the technology later" Gates is the standard bearer for a different kind of planning. The authors also look at the risks of the creative process because for every great campaign that succeeds and sends the competition reeling, there have also been colossal mistakes. *The Profit Zone* offers helpful worksheets to spur you on.

In *Technology Integration*, Iansiti calls for broad vision. Strategic planning is not just for senior management, nor should it be a one-time activity prior to rolling out a project. Iansiti advises planners to check how every stage fits the imagined final application. He makes valid points, but citations of other works and authors in the text detract from the impact of his message.

Portfolio Management for New Products has a narrower focus. The authors believe that individual products must constitute a portfolio and, like a mutual fund or stock portfolio, variety and attention are necessary. The authors also advise linking management of technology to R&D. *Portfolio Management* provides an implementation plan that readers may want to adapt or adopt.

Common to all four titles is the encouragement to perform self-diagnosis. Get teams to evaluate progress both as they proceed and after the fact. Whether you believe new product development is the next frontier or that e-commerce will send managers back to the drawing board, these four books can be useful.

—Sheila Neylon

THERE'S AN EMERGENCY BOARD MEETING. THE CFO NEEDS NUMBERS BY NOON!

You Need Them
Fast
You Need Them
Right
You Need
CFO Vision™



When you're under pressure to make critical business decisions, CFO Vision software delivers the timely and accurate information you need.

CFO Vision is the single source for all your key business information, both financial and non-financial—readily accessible for interactive analysis and reporting. It's never been easier to see product and customer profitability, the potential impact of a reorganization, or key performance indicators—in any currency.

You can view your business from all angles because CFO Vision is the first financial consolidation and reporting software that integrates flexible multidimensional analysis (OLAP). All from one vendor...SAS Institute, the leading name in decision support at more than 29,000 companies worldwide including the Fortune 100.

For a closer look, give us a call or visit us at www.sas.com/vision



SAS Institute Inc.

The Business of Better Decision Making

E-mail: cio@sas.com

www.sas.com/vision

919.677.8200

In Canada 1.800.363.8397

IBM®

DO STRANGERS WATCH



MHz denotes microprocessor internal clock speed only, other factors may also affect application performance. *GB=1 billion bytes when referring to hard drive capacity, accessible capacity may be less. 5 pounds is travel weight including battery and HDD. With additional CD-ROM drive or floppy drive, weight is about 5.5 pounds. Actual weight may vary. †May vary due to componentry and variances. *Model 31U. Estimated authorized IBM Reseller Price. Actual prices may vary. PCs referenced in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. Intel Inside and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. ©1998 IBM Corp. All rights reserved.



YOU UNPACK YOUR LAPTOP ON THE AIRPLANE?

INTRODUCING THE IBM THINKPAD 600

From the innovative covers that protect its docking port to the way the keys feel when you press them. From the way it's designed to integrate the latest technologies to the way it makes people look twice. There's something special about a ThinkPad® notebook. And the new ThinkPad 600 is no different. It's thin, light, powerful. It's got a big, bright, high-resolution screen. And it can accommodate a CD-ROM. All combining to make it more than just a tool you need, but a tool you want. See it at www.ibm.com/thinkpad600 or call 1 800 426 7255, ext. 4769.



Up to 266 MHz¹ Pentium® II processor / Up to 4GB² Hard Drive / Up to 13.3" display / About 5 lbs³ / 1.4" thin⁴ / From \$2,799⁵

e-business tools

Trendlines

STAMP OF APPROVAL

“Postage without licking or sticking—just clicking.”

—Retired Postmaster General Marvin T. Runyon on computer-generated stamps being tested by E-Stamp Corp. of Palo Alto, Calif.

Source: *The Washington Post*, April 1, 1998

WILL SURF FOR WORK

58%

of **IT** professionals would turn **first** to the **Internet** to **look** for a **new** job.

Source: McGladrey & Pullen LLP, Des Moines, Iowa

R2-D2, MD

MEDICINAL TECHNOLOGY The scene: an emergency room.

The staff labors to save a man in the throes of cardiac arrest. They struggle valiantly to stabilize him, but despite their best efforts, the patient dies. As the staff members stand numbly next to the bed, one starts giggling uncontrollably. What's wrong with this picture?

Actually, it's a snapshot of cutting-edge medical training. The medical team consists of nursing students at St. Petersburg Junior College in St. Petersburg, Fla., and the patient is a paisley-pajama-clad mannequin named Stan. Manufactured by Sarasota, Fla.-based Medical Education Technologies Inc. (METI), Stan is a 6-foot-tall, \$178,500 human patient simulator currently being used in almost 50 medical training programs around the world. Increasingly, robots like Stan are receiving assistance from members of the medical profession, whether they be medical students or surgeons in the OR. "The greatest advantage is the students can make mistakes on him," says Jodi Parks, director of nursing at the college.

Controlled by an external PC, to which he is connected by pneumatic lines and hoses, Stan reacts appropriately to more than 50 different medications and responds to treatments such

as CPR. Sophisticated mathematical models of human physiology and pharmacology determine Stan's reactions to the PC operator's commands. He responds to 70-plus medical scenarios, including pulmonary edema, diabetic shock and dysfunctional chest tubes. Users can program Stan to react to additional scenarios, and METI (www.meti.com) adds new ones to his repertoire

each year. (METI includes the necessary physical and software accouterments to transform Stan into Stanette.)

Some medical robots lend more than a helping hand—they lend an arm or two. Take the Aesop 3000, or Automated Endoscopic System for Optimal Positioning, from Computer Motion Inc. of Goleta, Calif. (www.computermotion.com). Used in minimally invasive surgical procedures, the \$65,000 Aesop attaches to the side of the operating table. Its slender metal arm manipulates thin optical tubes called surgical endoscopes—a painstaking task

that was previously performed by an assistant in response to the surgeon's commands. Aesop, which responds to 23 voice commands, does a better job than its human counterparts of holding the endoscopes perfectly still, according to Yulun Wang, Computer Motion's chief technology officer and founder. "[Aesop] gives the surgeon a third arm, giving him back direct control of

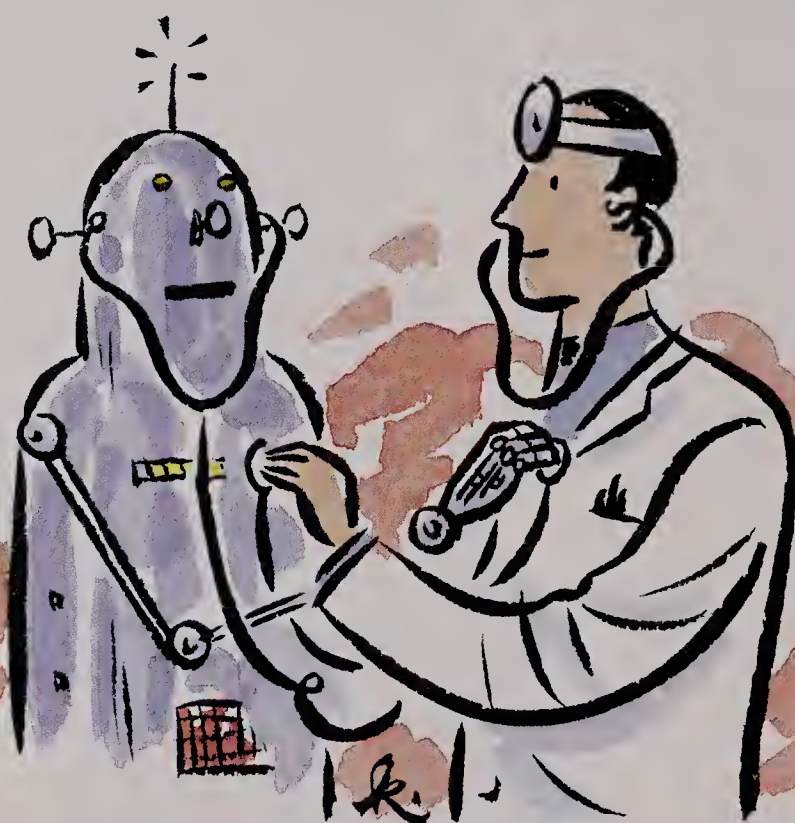


ILLUSTRATION BY KARA FELLOWS

You see dependability

We see the Internet



For the utmost in reliable, secure IP solutions, Sprint delivers.

With Sprint's portfolio of dependable IP services, your business can take full advantage of the Internet. We offer both intranet and security services, dial up and dedicated access, plus a patent-pending Web hosting service with site mirroring architecture that guarantees 100% availability.* So you can connect, transact and share information with customers, suppliers and employees with confidence—all backed by our industry-leading performance guarantees.

Business runs on data. And data runs on Sprint. www.sprint.com/data1 1-800-588-DATA



We help your business do more businessSM

Trendlines

his optical field," says Dr. Randall Wolf, a cardiothoracic surgeon at Christ Hospital in Cincinnati.

Computer Motion is currently developing the next generation of its technology, a robotic surgical system called Zeus. Using verbal commands, a surgeon controls Zeus's three robotic arms, one of which positions the endoscope and two of which position surgical instruments. Company officials claim using Zeus for minimally invasive surgery procedures will result in faster recovery times and fewer complications for patients.

—Lauren Gibbons Paul



Pod People

WORKPLACE DESIGN

BT Laboratories is giving new meaning to the phrase "immerse yourself in your work." The group's experimental SmartSpace project is a sort of work pod that puts the worker in a comfy chair and surrounds him or her with a gargantuan wraparound monitor, three-dimensional sound system, built-in PC with speech recognition capability and all sorts of telecommunications goodies such as videoconferencing. BT Labs, the R&D facility of British Telecommunications PLC, based in Martlesham Heath, England, built SmartSpace to model future work environments that will reflect "the convergence of IT, telecommunications and content," according to Mike Maternaghan, senior manager for advanced applications and technologies at BT Labs.

The team that built SmartSpace includes several of the labs' 80 "human factors experts," who ask people in the pod questions to learn about their habits and observe their reactions to new workplaces. Their conclusion thus far: "The facility has to suit the task," Maternaghan says. "People do see it as rather a gimmick, but when they have a genuine need for something like SmartSpace, they react very favorably to it." For example, BT Labs created a Virtual Real Estate Agency that allows prospective home buyers to "walk through" properties via the wraparound monitor.

SmartSpace isn't for sale; it was built strictly to help people learn about work environments. Growing your own would likely cost a minimum of \$15,000, which might make replacing cubicles with pods a bit pricey. But Maternaghan envisions gradual acceptance of this type of workspace, particularly in crowded city settings. "If this sort of concept took off, you might see it as the telephone box at the end of the street that you had years ago," he says. "Not everyone could afford [a phone], so we shared it. But as price comes down and the power goes up, it might become available to more people." ■

MODERN ETHICS



Shame on You!

It's America's latest dirty little secret: Almost half of U.S. workers have used technology unethically on the job during the last year, according to a recent survey.

The transgressions they fessed up to most frequently are the following:

- Creating a potentially dangerous situation by using new technologies while driving

- Wrongly blaming a personal error on a technological glitch

- Using office equipment to shop on the Internet for personal reasons

- Copying company software for home use

Source: American Society of Chartered Life Underwriters & Chartered Financial Consultants and the Ethics Officer Association

ILLUSTRATION LEFT BY FRANK CAMMUSO; ILLUSTRATION RIGHT BY DAVE KLUG

ADVANCED TECHNOLOGY IS ONLY AS GOOD AS THE PEOPLE WHO ADVANCE IT.

You can see the possibilities – superior customer service, competitive advantage, increased market share,

improved productivity and reduced costs. But how do you turn these possibilities into bottom-line results

quickly? By working with professional services consultants at Sun. Why Sun? We've got the people and

processes to create high-performance computing environments that deliver solid business solutions. We

created Java™ technologies. So we're up to big challenges. Like creating an architecture that handles



complex distributed networks. Or building a high-performance infrastructure for your mission-critical ERP



applications. Sun also offers educational and support services to further solidify your gains. So turn your

possibilities into bottom-line results, connect with the consultants at professional services from Sun. Find

us at www.sun.com/service/ad/ps.html or call the number below. THE NETWORK IS THE COMPUTER.™

TRUST US. SUN. 1-800-472-5101.

CRISIS MAN

(Why solve a problem when you

Because every mission is critical, we offer a range of preventive services for your most strategic applications running on HP-UX. We can help you achieve optimum performance and maximum availability by doing everything from designing a

MANAGEMENT

can avoid one in the first place?)

bulletproof infrastructure to assessing and proactively supporting your IT operations. And if the unavoidable does occur, we provide disaster recovery. Why wait for the next problem when you can avoid it altogether? Visit us at www.hp.com/go/mcservices.



Executive Counsel *Edited by Sara Shay*

MANAGING YOUR CAREER, STAFF AND PROFESSIONAL RELATIONSHIPS

Safe Exits

When you fire an IS staffer, make sure your company won't get burned

BY PETER FABRIS

IT WAS THE ULTIMATE I.S. NIGHTMARE. In July 1996, a soon-to-be-fired 30-year-old network program designer at Omega Engineering Inc.'s Bridgeport, N.J., facility allegedly planted a LAN-based logic bomb, a program that eats through files or reformats hard drives, in the com-

pany's network. Several weeks later, the bomb wiped out Omega's software and left the manufacturer of high-tech measurement and control instruments with an estimated \$12 million in lost sales and repair costs, making it one of the most expensive computer sabotage cases ever investigated by the U.S.

Secret Service. In January of this year, a federal grand jury indicted Timothy A. Lloyd of Wilmington, Del., on charges of planting the bomb.

Such vengeful, destructive acts by IS professionals toward their former employers are rare, but Omega's case highlights how vulnerable organizations are to them. IS workers, particularly those who administer and maintain networks, databases and other key systems, pose the biggest threat because of their high-level systems access and knowledge. So can you avoid the fate that befell Omega? "You can't stop a technologist from creating a logic bomb or a hole in your security systems," says John Puckett, assistant vice president of information technology at GTE Internetworking (formerly BBN Corp.) in Cambridge, Mass. "All you can do is let him know of his responsibilities and what is acceptable behavior for a person in a position of responsibility."

But by taking a few basic precautions, CIOs can reduce the risk of IT sabotage. Structuring your IS department so that responsibility for sensitive systems is shared, vigilantly adhering to security procedures and minimizing animosity toward the company by dismissing employees as humanely as possible can protect you—and your systems.

Share the Load

For starters, no one person should have responsibility for managing security and have access to all of an organization's critical systems. "Nobody should ever hold all of the keys to the kingdom," says Cris Castro, a principal with Ernst & Young LLP's information systems assurance and advisory service based in Palo Alto, Calif. Staff members who have responsibility for issuing network accounts and passwords, for example, should not be the people who audit those procedures and monitor compliance with security policies. Dividing these responsibilities between



CORNER IMAGE BY CARL TREMBLAY; ILLUSTRATION BY JANIS LLEWELYN / EYECON DESIGN

These world-class companies are on the same page for one reason.

Coopers
& Lybrand

Kellogg's

MCI

ARTHUR
ANDERSEN

CHASE

hp HEWLETT
PACKARD

3M

IBM

They all rely on Dow Jones Interactive,
the world's most comprehensive online business intelligence service.

Every day the people who drive these companies get smarter. Senior executives closely monitor their businesses and industries. Sales reps access information to develop effective, fact-based new business presentations. Marketing professionals scour the trade pubs and scan clipping folders to uncover the latest trends. Strategic Planners delve into the research needed to predict emerging market demands. And they do it all in seconds, right from their desktop PCs. It's no wonder these companies are among the most successful in the world.

In addition to arming their employees with corporate information networks, these companies all trust Dow Jones Interactive to provide the critical news and information to make those networks truly valuable. That's because Dow Jones Interactive delivers far more than business information, it delivers the unmatched insight that leads to business *intelligence*.

If you think your company's name should be listed among those on this page, it's time to put Dow Jones Interactive to work for you.

Take a free tour at djinteractive.com. Then call 800-369-7466 to arrange for a corporate consultation.



Dow Jones Interactivesm
Everything You Really Need To Know.

<http://djinteractive.com> 800-369-7466

Departing Shots

Take these steps when you have to dismiss a key IS staff member

- ▶ **Take away key card** access and notify security personnel and receptionists of the dismissal.
- ▶ **Consider password changes** across the enterprise, including in the voice mail system. The fired employee may remember colleagues' passwords or he may have created phantom accounts.
- ▶ **Escort the person** out of the building immediately after he has been fired. This reduces the chance that the employee will do something in anger that he'll regret later.
- ▶ **Inspect configurations** of all systems to which the fired employee had access. Look for evidence of sabotage, such as a computer virus, or efforts to circumvent firewalls and other security measures.
- ▶ **Make sure the employee** did not create any new accounts on the system before he left.
- ▶ **If you have a Web server**, make sure he did not create an opening in the firewall.
- ▶ **Assess port** configuration vulnerabilities.
- ▶ **Consider stepping up audits** of log reviews for a couple of weeks.
- ▶ **Step up use** of intrusion detection systems if you have them.
- ▶ **Notify your outsourcers** so that they don't inadvertently provide system access to the fired employee.
- ▶ **Notify vendors and clients** if appropriate. The fired employee may call a vendor and ask for a default password. If you are a provider of technical services, he might try to get that information from clients.
- ▶ **Make sure all online** purchasing access is revoked.
- ▶ **Consider reviewing** the employee's recent e-mail messages and files. He may have left clues if he's considering sabotage.
- ▶ **Keep one of your backup tapes** out of regular rotation. If a fired employee plants a malicious file, it will corrupt backup tapes. The one you've put aside may still be usable.

SOURCE: MARK MERCER, SENIOR MANAGER OF ERNST & YOUNG'S NATIONAL INFORMATION SECURITY GROUP, KANSAS CITY, MO.

two or more people reduces the opportunity for individuals to make mischief.

Omega learned that lesson the hard way. Before he was let go, Lloyd was both the company's chief network program designer and its network administrator. In his dual role, Lloyd managed the network and was in charge of updating and

backing up the company's databases and files. In effect, no one at Omega could match Lloyd's knowledge of the company's network or monitor his work.

Investigators charge that Lloyd anticipated his dismissal and planted the logic bomb before he was fired. About three weeks after Lloyd was canned, report-

edly after a falling-out with his bosses, the bomb went off. Omega's network operating system deleted all of the com-

"If you fire somebody and you don't know what systems he has access to, that's a big problem."

—Ron Tarro

pany's design and production files. The incident crippled the company's network and brought business to a halt. Lloyd also allegedly stole all the backup tapes and replaced them with blanks.

"We'll never rely on one individual like that again," says Al DiFrancesco, Omega's director of human resources. Omega now divides Lloyd's former duties among several people and stores a set of backup tapes at a secure, offsite location.

Access Abilities

One of the basic tenets of IS security is vigilant enforcement of systems access rules. This becomes especially important when a member of the IS department is let go. Foremost among the rules is keeping timely records of employees' accounts and passwords. In organizations with systems under the control of business units and with the growth of telecommuting and virtual organizations, keeping track of who has access to which systems can be a logistical headache. "Many organizations are out of control; they've lost knowledge of who has access to what," says Ron Tarro, senior manager of Ernst & Young's strategic advisory services based in Boca Raton, Fla. "If you fire somebody and you don't know what systems he has access to, that's a big problem." Unfortunately, Tarro says, that state of affairs is all too common.

It's wise to have a well thought-out, documented security policy outlining rules regarding systems and data access for the whole organization. The policy can also establish clear grounds for dismissing an employee who doesn't respect security rules. For Internet service provider GTE Internetworking, for example, sound security and reliability



Oops.

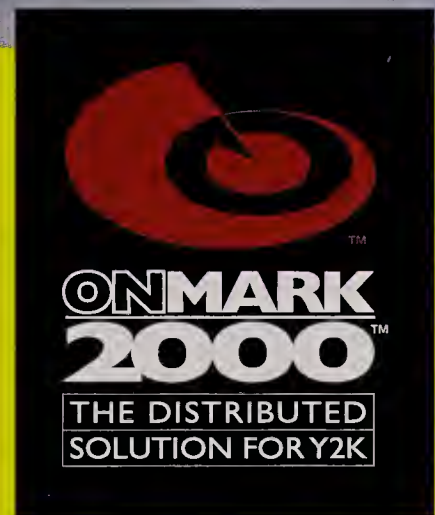
Don't screw up your desktop Y2K project.

We've all done it before...used the wrong tool for the job. Yet the year 2000 PC problem leaves little room for mistakes. Distributed environments are just as critical to your business as the mainframe. That's why Viasoft brings you OnMark 2000, the only integrated suite of desktop and client/server tools designed to help you overcome your distributed year 2000 challenge. From inventory collection and risk assessment to remediation and testing, OnMark 2000 delivers exactly what you need.

Get the right tools at www.onmark.viasoft.com.
Download a **FREE** OnMark 2000 demo,
or call us at 1.888.VIASOFT ext. 800.

The right tools at the right time.

www.onmark.viasoft.com



VIASOFTTM
Managing the Business of Information Technology

1.888.VIASOFT
ext. 800

Executive Counsel

are vital to the company's livelihood. Customers would desert GTE in droves if the company experienced a prolonged service outage for any reason, and they wouldn't have much sympathy if a logic bomb disrupted their e-commerce efforts or crashed their extranets.

To convey the company's commitment to high security standards, GTE Internetworking distributes a document

line the employee's recent e-mail messages and work files. It might be a good idea to purge his most recent programming work from your systems if sabotage may be a real possibility.

Also consider issuing new passwords to your whole staff, particularly if the fired employee has the ability to hack into your network from the outside. "He might remember that his colleague Suzy used her

let somebody go, make sure you are prepared to articulate clearly why you are taking that action, says Kavin Moody, executive in residence at The Center for Information Management Studies at Babson College in Wellesley, Mass., and a former IT executive at The Gillette Co. and BankBoston Corp. Remember, the employee may not fully comprehend the situation, even if he knew it was a possibility. "You have to recognize the shock element," Moody says.

In some situations during his tenure as a CIO, Moody offered to speak with a fired employee a week or two after a dismissal, when the shock had worn off. At that point, he would usually reiterate the reason the employee was let go and offer to answer any questions. If the person seemed receptive, he would discuss what steps he or she could take next. Moody remembers advising one former employee who was dismissed for not performing up to standards to get out of the IT business altogether. "I suggested that he try to make a career in something that he had a passion for," Moody says. "He didn't have a passion for technology." About a year later, the employee called Moody and said he had found success brokering yachts. He had made a new career for himself in sailing, a pursuit he loved, and thanked Moody for his advice.

Not all firings lead to such happy endings, but earnest attempts to help a former employee find a new job or even a new career can help reduce the animosity he or she might feel toward the company. Moody advises directing fired employees to human resources or outplacement consultants immediately so that they can begin preparing for the future right away. That will reduce the possibility that they will stew over the firing and seek revenge.

Of course, a truly determined logic bomber might be motivated enough to counteract any precautionary measures in an effort to strike back after a dismissal. "It's hard to protect against the criminal mind," Moody says. But by handling the firing sensitively and being prepared for the worst, you can reduce the chances of catastrophe. **CIO**

Senior Writer Peter Fabris can be reached at pfabris@cio.com.

Earnest attempts to help a former employee find a new job or even a new career can help reduce animosity toward the company.

to all employees that contains its IT security policy and states that failure to adhere to the policy could result in disciplinary measures or dismissal. The policy was reviewed by the company's executive management team and president, who sent a letter to all employees endorsing its measures. It states that employees should not try to access information to which they are not entitled, sharing passwords is forbidden, employees should not use technology for non-work-related activity and no one should attempt to bypass security protocols.

"A lot of it is just common sense," Puckett says. But instating written policies endorsed by top-level executives tells employees that the organization takes security very seriously, and no one can claim ignorance if caught violating the rules.

The risk of security breaches goes up after a dismissal, so CIOs have to be certain after an IS staffer is fired that everyone else in their organization strictly adheres to all existing security policies. In addition, it's prudent to take extra precautions, particularly if the dismissed employee was a network administrator or a security specialist or held some other position in which he could potentially wreak havoc. For example, IS managers should try to assess the fired employee's frame of mind before the dismissal. Did he have a history of disciplinary problems? How did he react when he learned that his job was in jeopardy? Did he threaten to retaliate? If you suspect that he might, you should exam-

ine the employee's recent e-mail messages and work files. It might be a good idea to purge his most recent programming work from your systems if sabotage may be a real possibility. dog's name for her password," says Mark Mercer, senior manager of Ernst & Young's national information security group based in Kansas City, Mo. That might be all the opening a technically adept former staff member needs to break into your systems from the comfort of his home. As organizations use the Internet to provide remote access to their databases and networks, they open themselves to hacking from the outside. Former employees who know which firewall product you're using and other technical specs of your systems can do the most damage. So even if you've taken away his key card, a fired employee can still do harm. In addition, it's sometimes a good idea to inform business partners about the termination of a key staffer. A malicious person may look to your outsourcer or vendors for help in wreaking havoc on your systems. He might, for example, call a vendor or outsourcer and say he forgot his password to the network operating system and ask for the default password (see "Departing Shots," Page 34, for a list of recommended security procedures).

Sensitivity Counts

In addition to taking security precautions, IS managers can reduce the risk of retaliation by handling the firing of an employee in a direct but sensitive manner. It's rare to have to fire someone on the spot for a serious infraction. What's more common is a dismissal as part of an organizational downsizing or when an employee isn't performing up to standards. Whatever the reason, when you



TIBCO software connects all your applications, databases and networks. You become a global, real-time, event-driven enterprise. (Over 500 of the world's leading corporations are.) You know instantly the relevant events that drive your business. Your business processes are integrated for smarter, faster decisions. You reduce cycle times. You deliver customer service at the highest level. You win.

And yes, that is rather fortunate for your enterprise.



 **TIBCO**
www.tibco.com

NEW YORK CHICAGO BOSTON HOUSTON PALO ALTO TORONTO WASHINGTON D.C. LONDON AMSTERDAM COPENHAGEN
STOCKHOLM FRANKFURT LUXEMBURG VIENNA ZÜRICH MELBOURNE SYDNEY HONG KONG SINGAPORE TOKYO

© 1998 TIBCO. All rights reserved.

Lights! Camera! Apps!

Online commerce is changing application development teams so that they operate more like—of all things—movie crews. Are you ready to don a beret and direct?

BY TED SCHADLER

MOST CIOs BELIEVE THE demand for Internet application development skills will put growing pressure on the collaborative skills of their development organizations. As the CIO of a large chemical company puts it, "We are not here to implement technology—we are here to implement business." Although the same CIO acknowledged that online commerce application development teams require personnel whose skills are balanced between business and technology, Forrester Research Inc.'s research reveals that this kind of vague commitment to cross-functional

teams won't avert disaster (see "The Production Crew," this page). Obsolete managerial habits combined with the cultural differences found in team members from different functional business backgrounds will only brew trouble.

The Crisis

As companies jump to meet the online commerce challenge, the current IS-led development process will fail. Here's why.

Today's development efforts are narrowly defined around programmers—holders of what Forrester calls the first skill. The second skill, design,

is held by user interface and content developers. Developing online applications would be straightforward if these two groups comprised all the skills required for Net application development, but successful online commerce applications also require the insight and commitment of marketing and business groups. Unfortunately, simply bringing marketing and business people together with IS-led content teams won't result in successful online commerce.

Three factors prevent the team from succeeding. First, IS, marketing and business don't speak the same language. That's probably not news to anyone who realizes these factions don't even assign the same meaning to words such as "programming," "transactions" and "channels." Second, the disparate elements of a cross-functional team have different ideas about what constitutes an effective process. Marketing and business, for example, work on a calendar schedule to set and meet customer expectations; IS delivers internal applications when it is finished. Matching these two scheduling cultures is a nightmare. The third reason why simply assembled cross-functional teams fail is that the three groups have no common ground for understanding what constitutes success. IS success is measured on lines of code or bugs per line of code; business success is measured on ROI; marketing success is measured on response rates or leads generated.

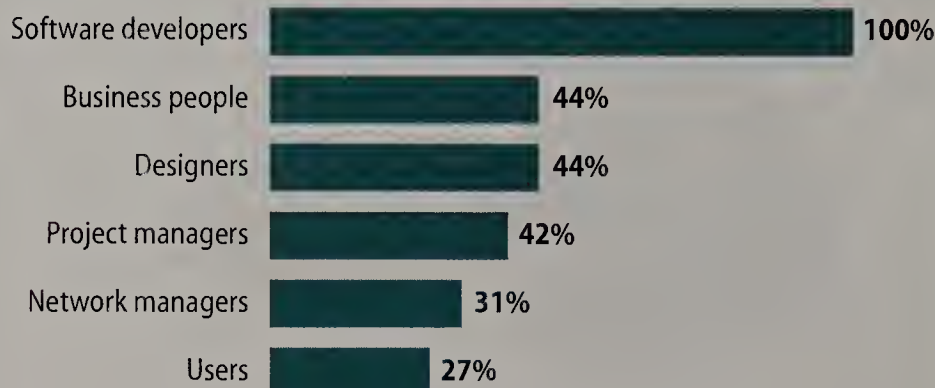
Although these differences interfere with team cohesion, there is hope. Abandoning reflexive managerial structures and adopting new tactics can set an organization on a path to faster—and superior—application development.

Three Steps to the Third Skill

During the next year, aggressive companies must move their online commerce development to production teams. Production teams differ from

The Production Crew

Executives reveal the makeup of their Net application development teams



Percent of 50 Fortune 1000 companies interviewed
(multiple responses accepted)

SOURCE: FORRESTER RESEARCH INC.

IS Net development groups in three significant ways:

- These small teams are composed of the traditional components—professionals from IS, marketing and business—but incorporate a powerful, new component: outside partners.
- These teams are not led by IS.
- The professionals on these teams collaborate in a production process.

This cross-functional team is inspired by a format used in the entertainment industry. Hollywood and Broadway use a collaborative team system that coordinates diverse technical and creative talents to achieve results that go beyond any single expertise or philosophy. Forrester believes this model applies to online commerce. We call the set of competencies

qualified candidates, human resources should scout business-oriented managers from the company's IS projects, team leaders from management and technical consultancies, experienced commercial software vendor product managers and techno-MBA grads from schools like MIT's Sloan School of Management or Carnegie Mellon University.

Step 2: Adopt specialized language and processes. Effective production teams start out by resolving the language and process ambiguities that fracture the old-style IS-led group. To make each member's work plain to the others and to users, individual members from the different disciplines must collaborate on HTML storyboards that preview the application. This visual technique for

affects the corporate brand, the production team must develop a sophisticated brand awareness that draws on the collected talents of the team. On the day an IS team member can hold an intelligent conversation about brand value and market penetration and a marketing person can talk about the advantages of digital certificates over password protection, teams will know they have mastered the third skill. And they will know they've achieved project success when the entire team understands and measures success in hard business terms—ROI or response rates.

What to Do Now?

CIOs must support two new fronts. First, although it may hurt, hand over management of your best coders to the newly created production teams. Second, help build the production infrastructure for effective collaboration by providing version control that supports code and content. With overlapping product cycles and many contributors, a database-driven version control system is required. Your teams will also need an intranet home page that serves as their war room. This site is most useful—and most used—when it answers all questions about the product. The war room should include threaded discussions about specific components and product features, the product storyboard and online access to all versions of the product in use or under development. Finally, CIOs can provide their teams with whiteboards from such companies as Microsoft Corp. and PictureTalk Inc., in Pleasanton, Calif., that offer easy visual collaboration. Coders are used to sharing code via e-mail, but teams working on visuals in different locations require better long-distance collaboration tools.

With production teams and the third skill in place, the shift to Net applications and online commerce can begin in earnest. Virtual supply chains, 24/7 selling channels and self-navigated internal applications will come together to drive a faster, more flexible enterprise. 

Ted Schadler, a senior analyst at Forrester Research Inc. in Cambridge, Mass., can be reached at 617 497-7090 or tschadler@forrester.com.

Simply bringing marketing and business people together with IS-led content teams won't result in successful online commerce.

that weaves the diverse talents of IS, marketing and business into a continuous production process the third skill.

Companies acquire the third skill when managers create production teams that adopt specialized language and processes to build online commerce applications that extend the corporate brand. Here's how to get started.

Step 1: Create production teams that are led by a "producer." The producer—akin to a Hollywood producer or director—is a leader with connections to three camps: technical, marketing and business. The producer must rise above the day-to-day IS and creative designer attitudes to keep the team focused on self-service commerce applications that lead customers through an online process of questions, answers, decisions and buying commitment. The producer must acknowledge and defuse internal resistance from people entrenched in sales channels, order fulfillment processes and payment systems.

Effective producers are managers who are skilled communicators, have labored in the IS trenches, possess a strong vision of the commercial potential of the Internet, have breadth of experience and are inspired by market or business challenges. This is a rare combination. For

capturing user needs, business processes, marketing messages and technical events reveals the entire application story. Just as filmmakers plot a movie, strategize shooting schedules, design backdrops and plan location shots, this method makes it possible for team members to hyperlink from storyboards to more detailed plans and agendas—and enables the team to digest new input quickly.

Process ambiguities can be eliminated if a team coordinates its activities with a continuous four-phase development process: define, design, develop and deploy. Tied to a 90-day release schedule, this production process ensures that IS's technical invention time line is tightly aligned with market dynamics. The key to effective synchronization is to establish frequent checkpoints and make sure everyone understands that the features cut to meet the deadline will be picked up in the next rapid release.

Step 3: Represent and extend the corporate brand. IS has typically built applications for internal use. But, like commercial software products and media properties, online commerce reaches users outside the company. Because online commerce is both an application and a powerful communication medium that directly

Looking For an Alternative to Consultants?

Intellectual Capital That Makes **You** the **Expert**

THE CIO CONSULTWARE SERIES™

Knowledge management
just got easier. The CIO
ConsultWare Series products
are innovative research tools
that provide specific
knowledge and actionable
information on the critical
technology management
issues you need to enhance
your company's productivity
and bottom line.

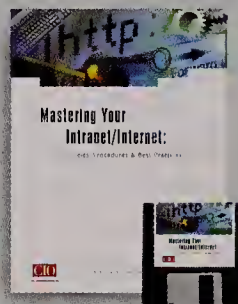
CIO ConsultWare takes research to a deeper and interactive level by providing benchmarking data, in-depth case studies, models to help you manage the complexity and tools to get you started—all in easy-to-use reports, CD-ROMs and diskettes.

Mastering Your Intranet/Internet

\$1,495

Learn how other organizations are managing, using and deriving business value from Intranets and the Internet.

BONUS: A digital document with customizable policy, policy memo and ready-to-go presentation

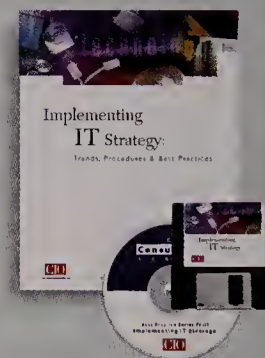


Implementing IT Strategy

\$2,295

Shorten your planning cycle and create a process that works for your entire organization. The report and CD-ROM provide best practices, benchmarking models and customizable tools to build your framework.

BONUS: A ready-to-go presentation with over 50 slides of data and analysis for presenting to peers and executives

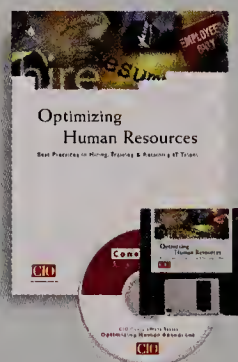


Optimizing Human Resources

\$1,995

A compelling report on the best practices in hiring, training and retaining IT talent. Four comprehensive site visits are included in the research analysis.

BONUS: A ready-to-go presentation to report the findings of this study to others in your organization

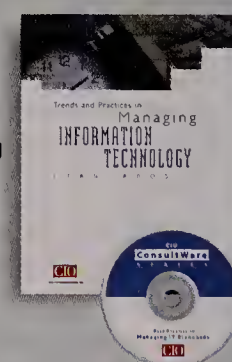


Managing IT Standards

\$1,495

Whether you amend your current process for managing IT standards or need to establish new practices, this landmark study will enable you to intelligently evaluate your options.

BONUS: Customizable memos and presentation to help you build support for your new initiatives



See It!



"Too much information can enslave innocent users."

Reader ROI

DATA VISUALIZATION technologies are being rolled out to commercial markets. In this story, readers will see

- ▶ That data visualization technologies were developed by the intelligence community to organize unstructured information
- ▶ How these systems are being applied to business problems
- ▶ Interface samples that make the most of data visualization for IS

Call me Doc Data. We at the Center for Informational Opportunities increasingly see businesses threatened by torrents of unstructured, multimedia data. It comes from all sides. There's no stopping it. Customer, competitive and collateral information without end!

CIO's mission is to help businesses find order in informational chaos—to seek out new systems and new applications—and to boldly present data as it has never been presented before.

My team of super-users—the Infonauts—scour cyberspace for innovative solutions. They have come to me with an exciting discovery. Will data visualization relieve information glut for business?

Imagine if you could visualize what you know—not merely understand but see. Imagine 3-D screen displays of your systems in shapes, sizes and colors! With such tools you can prioritize efforts, allocate resources, you can...

But wait; I'm getting ahead of myself.

Join us now, please, as the Infonauts and I explore the past, present and future of data visualization technologies.

**Turn and unfold
and let us begin...**

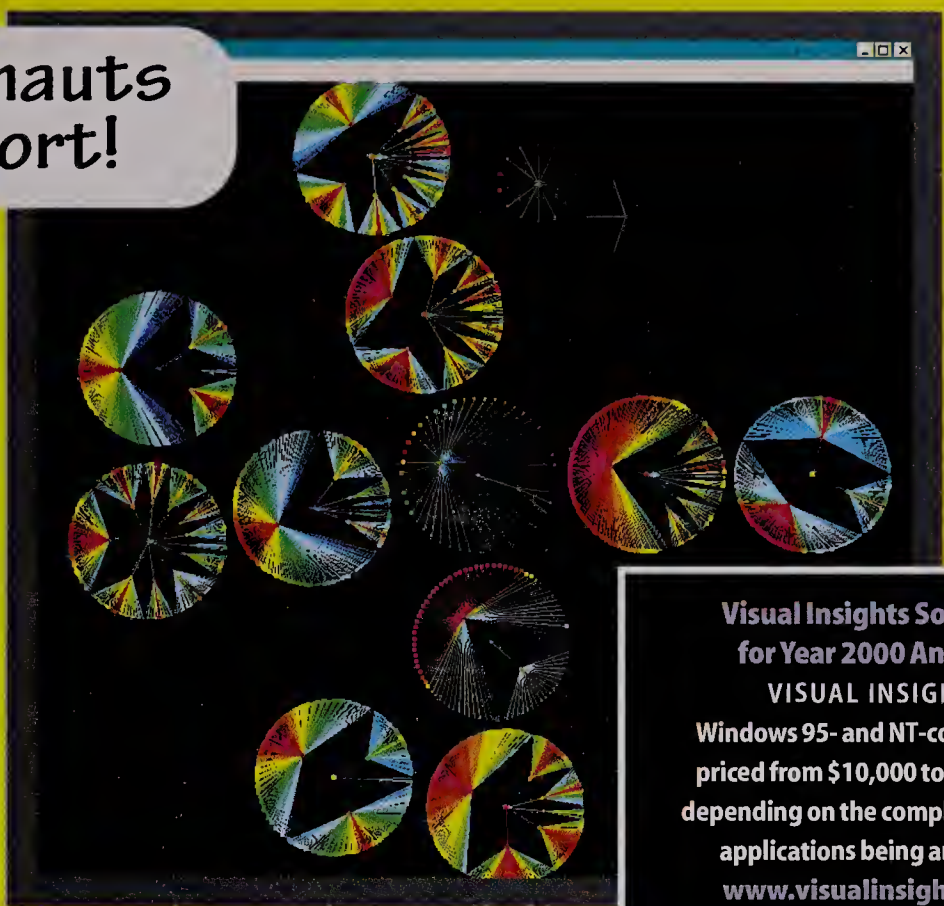


Infonauts report!

See the Picture

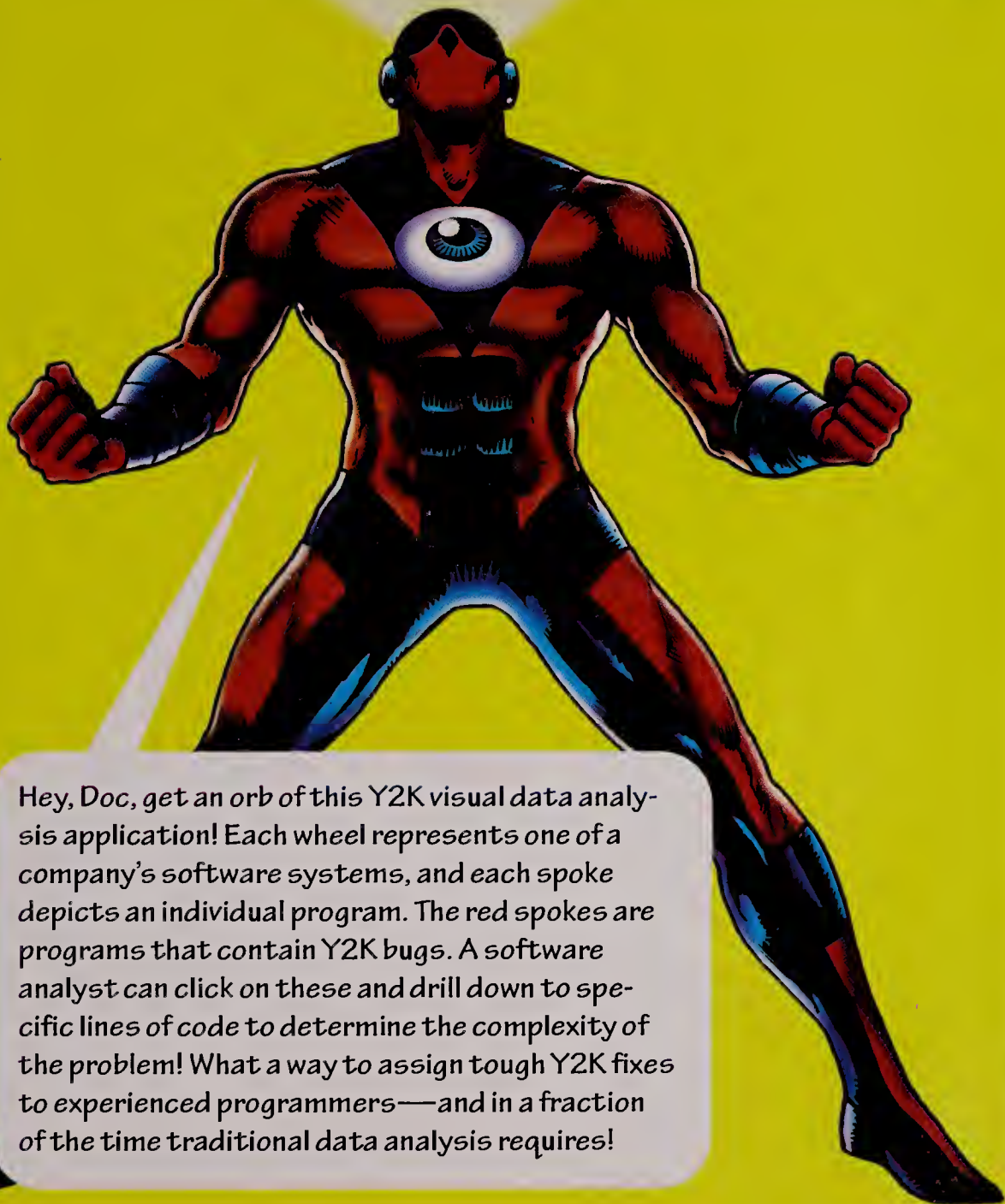
Visual Insights Software for Year 2000 Analysis is but one of several new Visual Insights data visualization products resulting from years of R&D at Lucent's Bell Laboratories. And Visual Insights is but one of several vendors offering such tools. Each promises to help users dig gold from mountains of multimedia data. But don't get carried away in the enthusiasm of a vendor-driven gold rush; first understand what data visualization can and can't do.

In the 1980s, the Central Intelligence Agency was among the first to use data visualization technology with its "A Picture is Worth 1,000 Words" project. The project created a new means for analysts to assimilate all of the documents, images and maps relevant to their missions—what the intelligence community calls "unstructured data." The Pacific Northwest National Laboratory (PNNL) in Richland, Wash., tackled this problem and, with help from The Boeing Co. and Applied Technical Systems Inc., emerged with Starlight, a solution that lets users organize massive amounts of data and identify complex interrelationships (see Page 48). The U.S. Army's Intelligence and Security Command also uses Starlight to conduct enemy intelligence analysis. "It's a complete shift in how one thinks about dealing with information," says Randy Woodson, a PNNL senior program manager who has managed the Starlight program since its inception. "One senior civilian analyst says he likes [Starlight] because it works the way he thinks. It helps drill in and get right to what he's focusing on." Buoyed by this success, PNNL plans to offer a commercial version of Starlight by year's end.



Visual Insights Software for Year 2000 Analysis VISUAL INSIGHTS

Windows 95- and NT-compatible;
priced from \$10,000 to \$200,000,
depending on the complexity of the
applications being analyzed.
www.visualinsights.com
800 295-3067



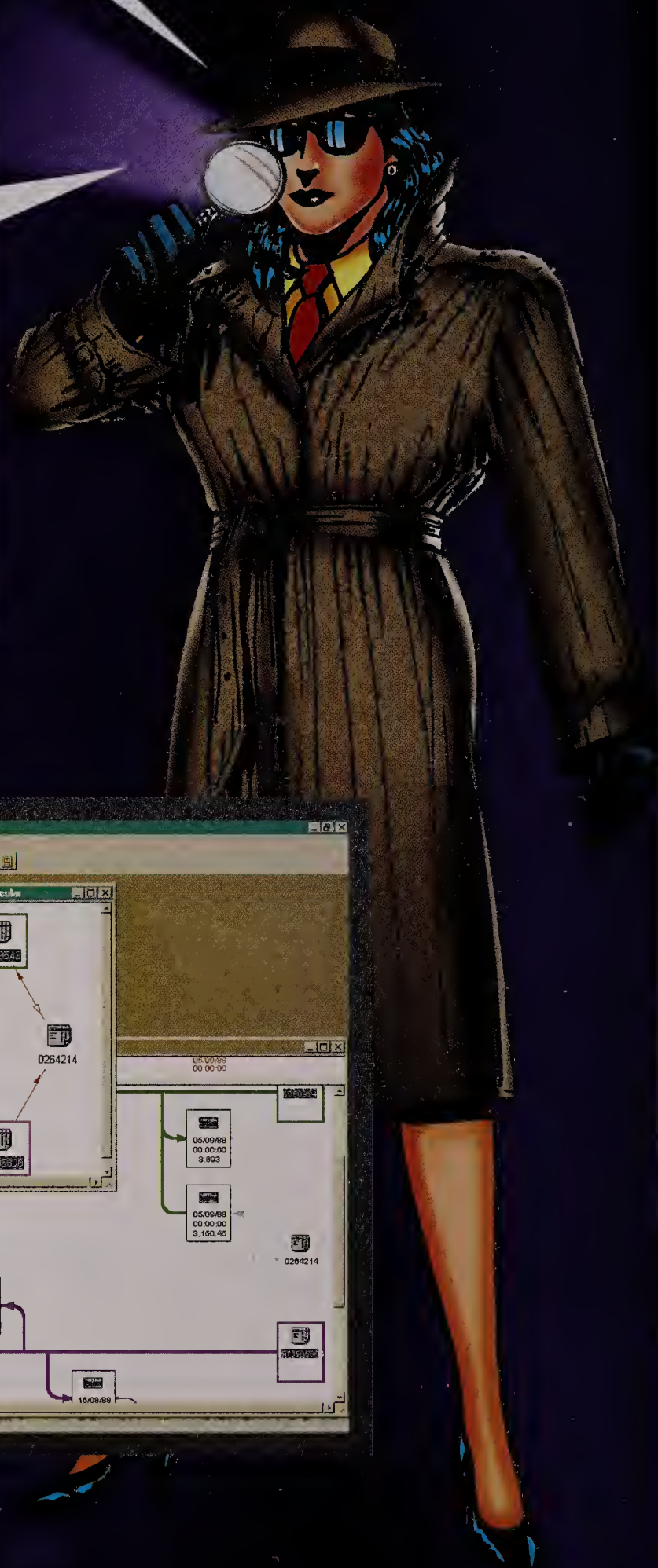
Hey, Doc, get an orb of this Y2K visual data analysis application! Each wheel represents one of a company's software systems, and each spoke depicts an individual program. The red spokes are programs that contain Y2K bugs. A software analyst can click on these and drill down to specific lines of code to determine the complexity of the problem! What a way to assign tough Y2K fixes to experienced programmers—and in a fraction of the time traditional data analysis requires!

See the Law

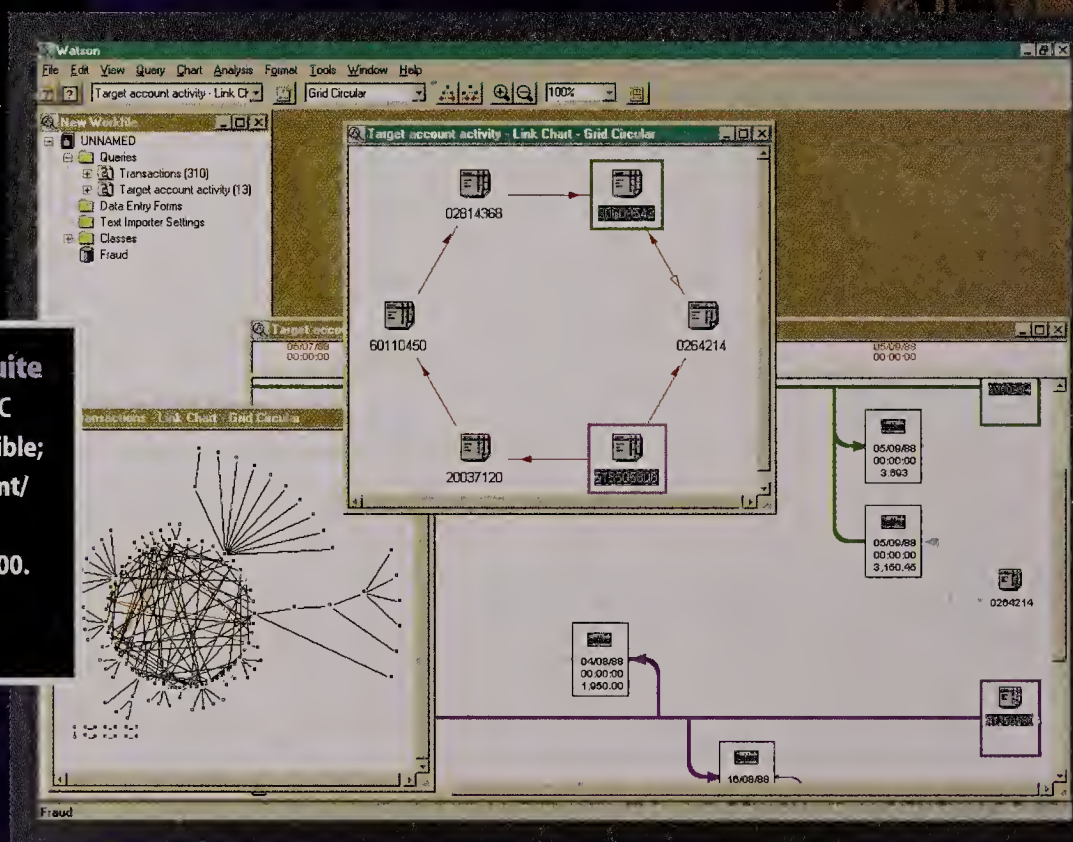
Law enforcement agencies adopted data visualization technologies early, and Cambridge, England-based Harlequin Group PLC was an early provider. One of the products in Harlequin's Intelligence Suite is Watson (named after the famous detective's earnest assistant). It helps investigators import, track, analyze and interpret data from existing databases—for example, police reports, witness statements and even telephone records. Once processed, the data can be rendered as objects or time lines or plotted onto maps with mapping software from MapInfo Corp. Currently, the U.S. Immigration and Naturalization Service (INS) uses Watson to help investigators understand and present the connections among large-scale criminal conspiracies. "The charts produced from Watson are used during case development to convey the analysts' understanding of the conspiracy to both field investigators and prosecuting attorneys," says David Cartier, an intelligence research specialist at INS. "These charts also are an excellent tool for prosecutors to display to a judge and jury complex details of cases in a more easily grasped graphical depiction." Recently, INS upgraded both its database system and its Watson application. Now, Cartier says, "We should be in a better position to interpret our data more quickly and in ways never before possible at our site."

It doesn't take Sherlock Holmes to deduce data visualization's commercial prospects, Doc! Oil companies could track and match fuel deposits, pipe flow and customer demand; doctors could battle illness with a world of easily accessed patient, disease and pharmaceutical information; financial analysts could see earnings, savings and investment trends!

Of course, I'm partial to the investigative applications! In this rich example, investigators in a fraud case are able to demonstrate how a series of complex, seemingly unrelated financial transactions flow through two key, targeted accounts. By visualizing complex associations among people and their activities, detectives often find the key to cracking tough fraud, drug and even murder cases. It's elementary, my dear!



Harlequin Intelligence Suite
HARLEQUIN GROUP PLC
Windows 95- and NT-compatible;
single user or multiuser client/
server configuration;
priced from \$5,000 to \$18,000.
www.harlequin.com
617 374-2400



Perspecta SmartContent System
PERSPECTA INC.
 Runs on Sun Microsystems Inc.
 Solaris 2.5 servers;
 server licenses start at \$30,000.
www.perspecta.com
 415 437-4150

Here's one that blows even my mind, Doc! A&R Partners, a high-tech public relations company in San Francisco, offers a Web-based news site, AllTheNews (www.allthenews.com), that draws from the wealth of technology information all over the Web. At the main news page you'll find a list of top news stories and related links as well as a grid of news categories: company news, industry segments and other hot topics. Click on a topic, and eventually you'll extract the hidden nugget of news you need!

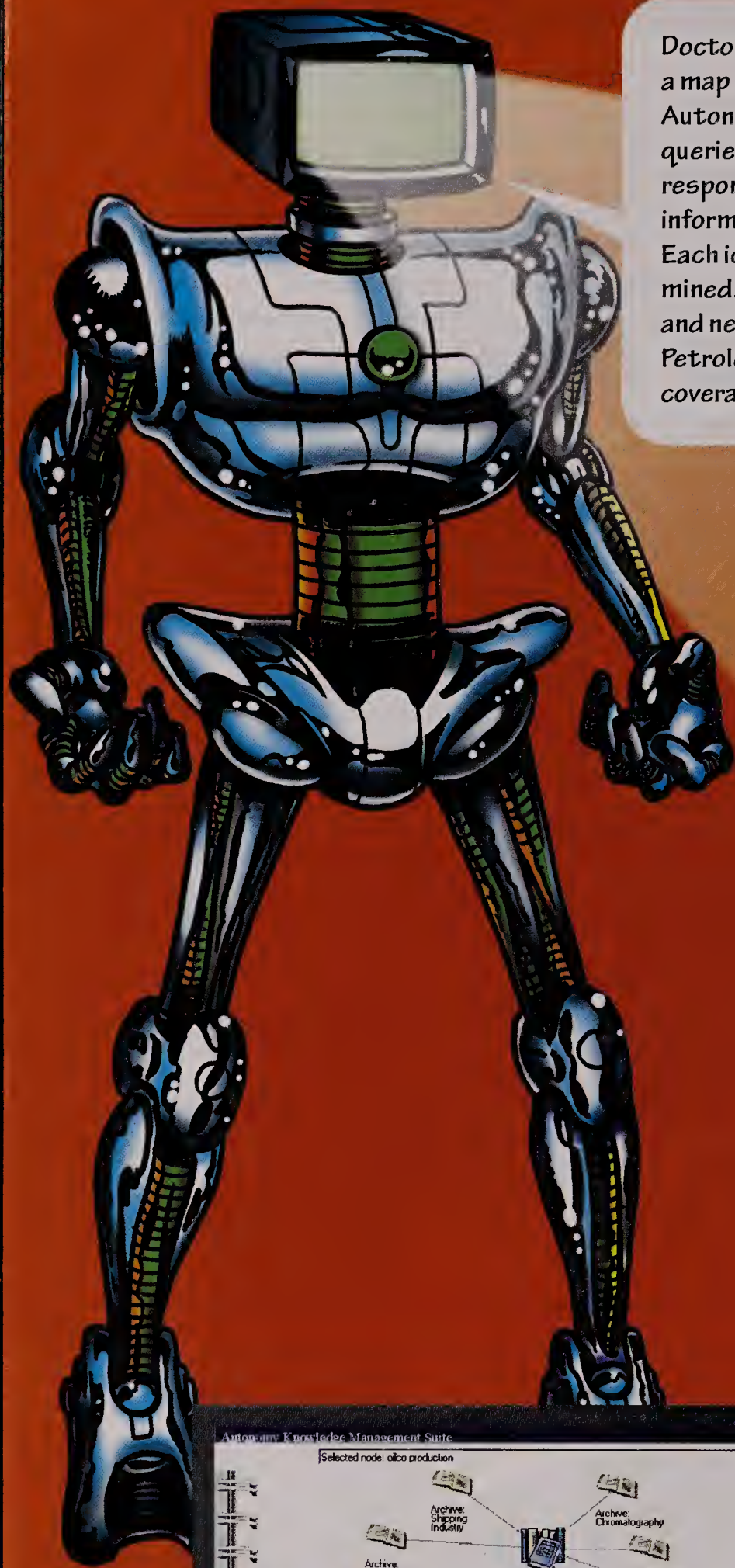


See the Data

Information providers—travel agencies, brokerages and publishers—are natural customers for data visualization tools. That's the belief of Perspecta Inc., a San Francisco-based software development company whose SmartContent System helps customers organize, deliver and present information available on the Web. SmartContent is similar to online analytical processing, except that it organizes nonnumerical information. SmartContent analyzes basic information such as author, title and topic and identifies connections among the information objects. In some ways, SmartContent is like a Web search engine that provides context to its content searches. The concept underlying the technology was originally developed at the MIT Media Laboratory by Perspecta founders Earl Rennison, Lisa Strausfeld and Nicolas Saint-Arnaud. In addition to A&R Partners (pictured above), Perspecta's customers include The Sabre Group, which uses the system to help travel agents put together customized tour packages, and Time New Media Inc., which uses it on the Pathfinder news site to help users access information from the online edition of Fortune and, eventually, from all of Pathfinder's online news offerings.

Autonomous

Server-based
pricing



Doctor, what if a single question posed to a database resulted in a map of answers? Products from San Francisco-based Autonomy Inc. make this a reality. In this screen shot, a user has queried about "OilCo offshore oil drilling." The application responds with a visual map of news releases, e-mails, archived information, charts and individuals with specialized knowledge. Each icon represents a source of information that can be further mined. Barclays Bank PLC uses the product to monitor Web sites and news feeds, as does the U.K. office of Shell International Petroleum Co., to keep tabs on the company's multimedia news coverage. To visualize data makes great business sense, Doctor.

See the Connections

"Where are the monkeys?" Autonomy founder Michael Lynch urges CIOs to ask data visualization vendors this question. Many products require data elements to be "tagged," or manually coded by system administrators (or, as Lynch jokingly calls such workers, "monkeys"). The process eats time, and it presumes that users know where to find answers to questions they've not yet asked. Autonomy's data visualization software comes sans monkeys, employing Adaptive Probabilistic Concept Modeling (APCM) algorithms to analyze, sort and cross-reference data. The APCM-based software identifies key concepts in data, along with frequency and relationship of terms. This pattern recognition technology originally was developed by Autonomy's parent company, Neurodynamics Ltd., for use in British intelligence and defense applications, including the Holmes2 system, which helps British police solve crimes à la Harlequin's Watson products. Flashy images and filtered information aside, Lynch says, data visualization's real payoff won't come until the tools themselves can collect and analyze data to match users' needs. "There is gold in [data visualization]," Lynch tells prospective prospectors, "but it's buried in a whole lot of mud."

Sounds quite logical, no? But two words of advice before you try visualizing your own data:

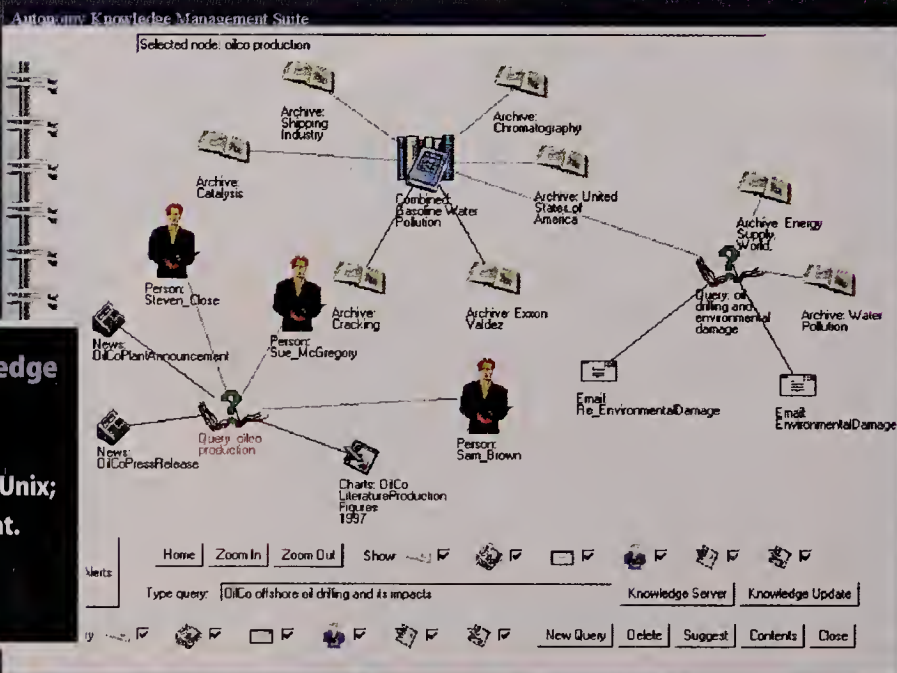
Be Careful!

Explain why, Infonaut.



Continued on Page 48

my Agentware Knowledge Management Suite
AUTONOMY INC.
used for Windows NT and Unix;
from \$50 to \$100 per seat.
www.agentware.com
415 243-9955





**YOU MIGHT BUY THE IDEA
THAT A LOT OF SERVERS
CAN DO THE JOB
OF THE NEW S/390® G5 SERVER.**

**BUT THEN YOU'D
HAVE TO BUY
A LOT OF SERVERS.**

IBM S/390 PARALLEL ENTERPRISE SERVER - GENERATION 5™

With twice the power of its high-end predecessors, the new CMOS-based S/390 G5 enterprise server easily handles the largest workloads. It supports UNIX®, Java™ and hot new apps like SAP R/3, Baan*, PeopleSoft, Oracle Applications and Lotus® Domino™. It even helps reduce cost by enabling server consolidation. And all this can be run as a single enterprise system. Looking to do business on the Net? The S/390 server offers Parallel Sysplex® technology with unsurpassed 99.999% availability and bulletproof security. To put a lot more server behind your enterprise, visit www.s390.ibm.com/g5 **IBM S/390: The defining standard in enterprise computing.**

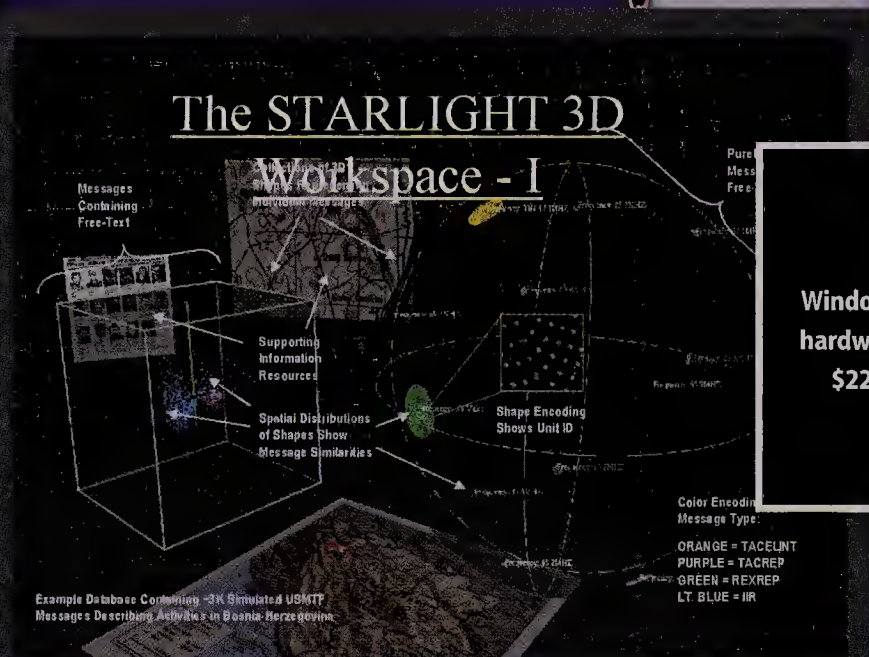


@business tools

Let me shed some light on the subject, Dr. D! Starlight's 3-D representation of military activities in Bosnia-Herzegovina might make the visual representation of complex data look easy. But the truth is, few of these applications have users who can attest yet to long-term benefits, and start-up costs can be as high as \$250,000—a big investment for an application whose ROI is still under construction! Also, these systems collect and organize data faster than humans can. Is your organization prepared to shift its trust—and financial support—from human staff to software systems? Don't let a culture shift become a culture shock!

See the Patterns

U.S. Army Lt. Col. Carl W. Hunt, the Army's senior representative to the Starlight project team, believes data visualization will work for industry. "Uncovering complex relationships within a widely dispersed information space is no different for business leaders than for military commanders," he says. Visualization systems help users find the edges, the seams of complex information, from which patterns emerge and new knowledge is gleaned. "Neither Starlight nor any other system may [enable that level of analysis] yet," Hunt says. "But if the developers of these systems focus on helping users uncover such patterns, then they'll make a significant contribution." **CIO**



Starlight
PACIFIC NORTHWEST
NATIONAL LABORATORY
Windows NT-based desktop application;
hardware is priced between \$10,000 and
\$22,000; software is not yet priced.
www.pnl.gov
509 372-6420

Good work, Infonauts!
Now we leave you, dear CIO
visitor, to venture forth and
explore how your organization
might begin to visualize
its data-rich future!

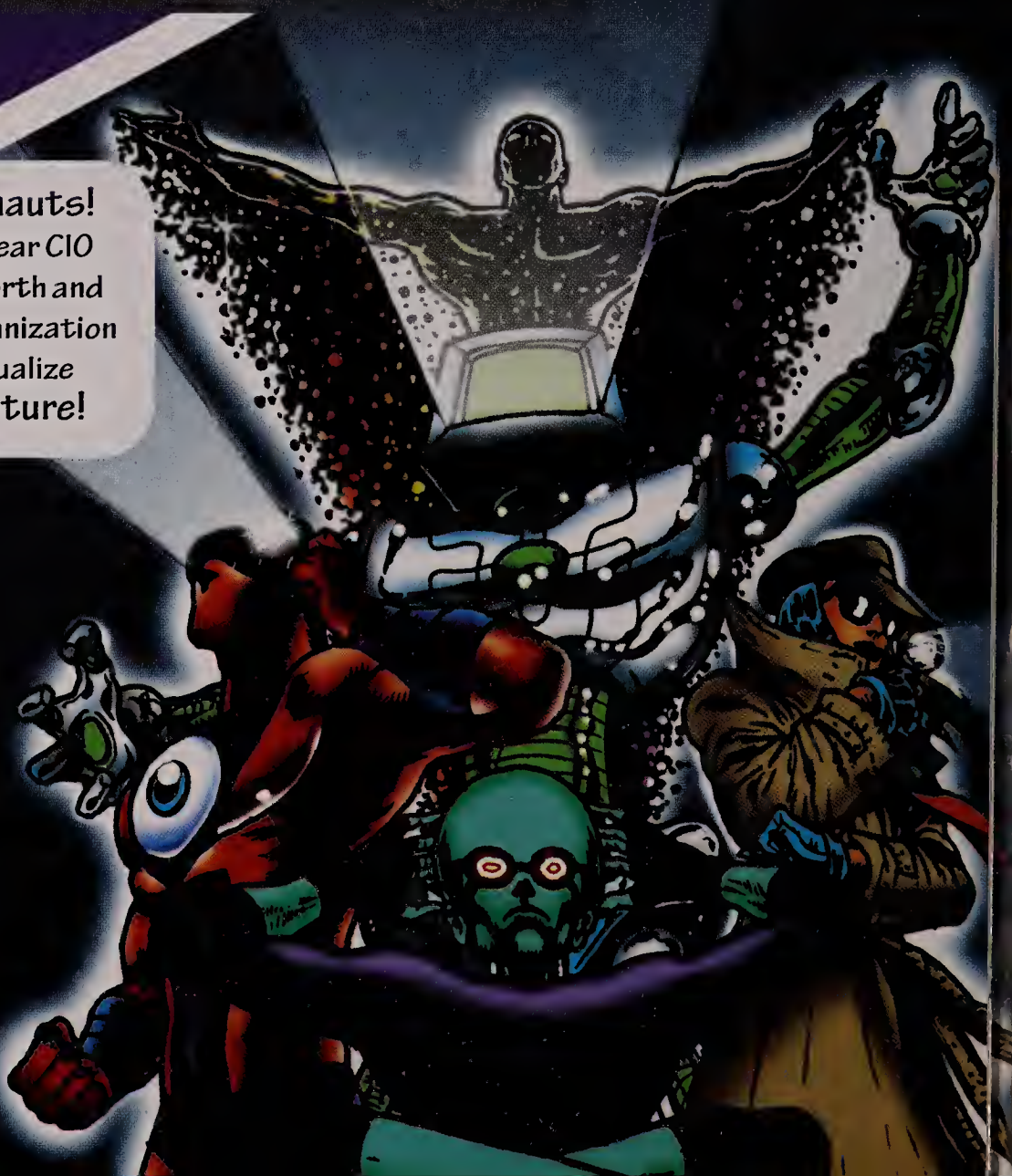


Conceived & Edited by
PERRY GLASSER

Written by
TOM FIELD

Designed by
MICHAEL SIGGINS

Illustrated by
THE DYNAMIC DUO





Your customer is at 4 minutes and holding.
Care to wager how much longer she'll be
your customer?

Treat a customer right and you'll keep their business. Lose focus on your customer and your competition will be right there. But, how can you ensure customer loyalty? Call Quintus.

Quintus gives your sales and service people the information they need to keep customers happy with the industry's only end-to-end call center solution. So any customer request, whether

via telephone, fax, e-mail or the Internet can be instantly and accurately handled.

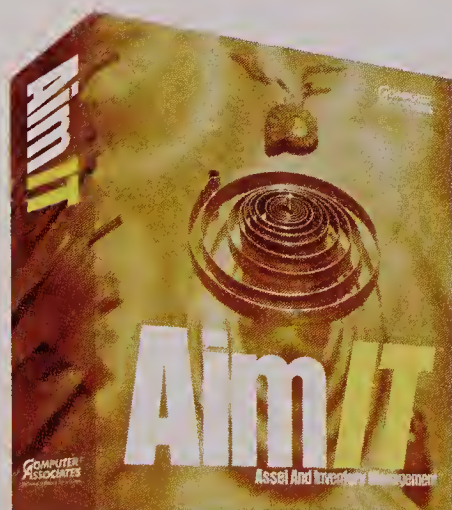
Fifteen of the *Fortune 50* already use Quintus to build customer loyalty and reduce costs. "Customer for life" is not an outdated ideal. You just have to make the right call. 1-800-337-8941. Or visit www.quintus.com.



QUINTUS

Turning contacts into loyal customers.

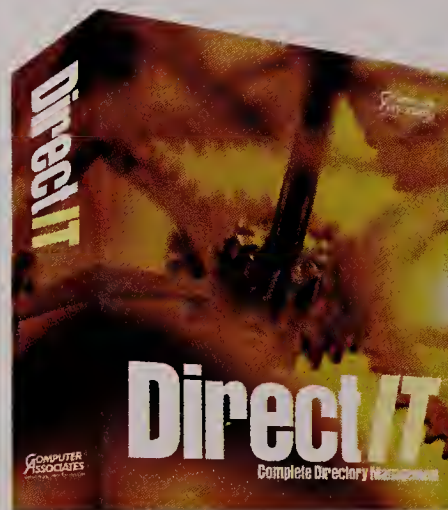
Go For *IT*.



Asset And
Inventory Management



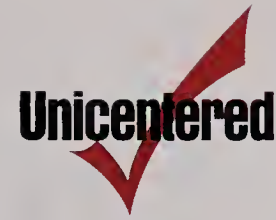
Total Network
Security



Complete Directory
Management



Secure Data
Communication



Unicentered



IT is a new generation of management software that's unlike anything you've ever seen before.

IT is a family of best-of-breed solutions that can tackle all of your network and systems management challenges.

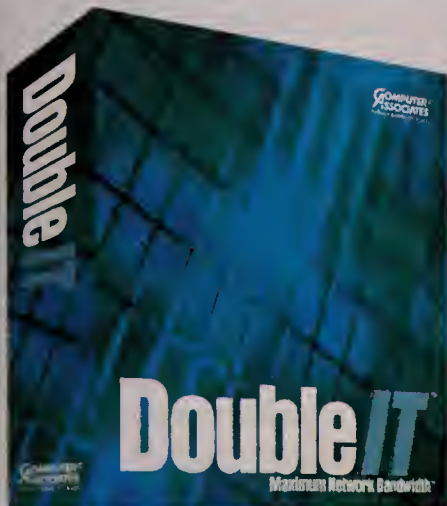
IT's smart. *IT*'s new. *IT*'s different.

Call for information and you'll be glad you did.

Because this really is, as good as *IT* gets.

Call 1-888-864-2368 or visit www.cai.com

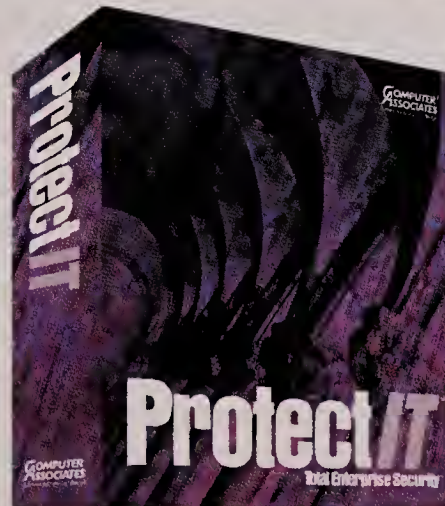
**COMPUTER[®]
ASSOCIATES**
Software superior by design.



Maximum Network
Bandwidth



Total Network
Management



Total Enterprise
Security



Automated
Software Delivery

The Gorilla Game for CIOs

*Bargain with kings and princes, but after you've blustered
and bluffed, never, never dicker with a vendor that is a gorilla.
The beast just might hold the key to your IT planning.*

BY GEOFFREY MOORE

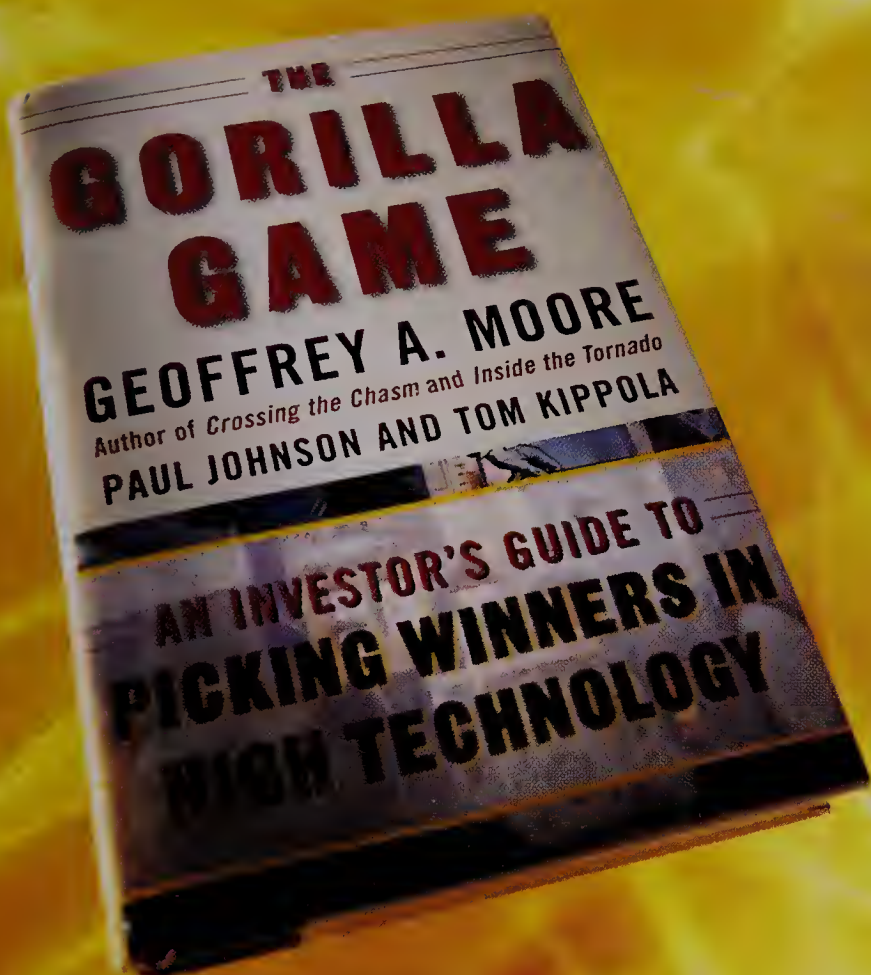
THE TECHNIQUES INVESTORS USE TO EVALUATE THE potential performance of technology companies can be adapted by information executives for strategic planning. In high-tech, as investors and information executives know, betting on the future prospects of a company is more risky than in other sectors. The chancy situation requires successful investors to adopt some new rules, which are set forth in *The Gorilla Game: An Investor's Guide to Picking Winners in High Technology* (HarperCollins Publishers Inc., 1998).

High-technology businesses continually bring to market discontinuous innovations—new technologies that promise dramatic increases in price or performance but are not compatible with existing systems. These innovations challenge the marketplace to create a new supply chain for their delivery and support. Sometimes the marketplace responds with a “yea,” and such innovations as PCs, laser printers, LANs, relational databases and Web sites charge onto the scene. But sometimes the answer is “nay,” and such innovations as pen-based laptops, wireless LANs and massively parallel computers are greeted by a vast indifference. CIOs who committed resources to the former look like geniuses; those who committed to the latter look like the main course at Thanksgiving. The key is not to commit until the

technology has “crossed the chasm,” that gap in the technology adoption life cycle. Until a fully functioning supply chain arises to support the new offering, an innovation’s long-term viability is suspect.

As a CIO, if you sponsor a technology before it has crossed the chasm, then you have to be prepared to write off the entire investment, including the cost of returning to a supportable infrastructure if the technology fails. There may be a business case for taking this risk—Wal-Mart had one back when data warehousing was no sure bet, for example—but committing to a new technology should never be undertaken without a contingency plan.

Once technologies cross the chasm, the risk to a CIO is no longer a matter of investing resources in the wrong category but one of investing resources with the wrong vendor. Many markets in enabling technology develop along a winner-take-all model, and CIOs who back anyone but the winner are in for a hard time. When markets replace an old infrastructure, they do so in a big hurry. Business, naturally, wants to get back to business and end the transition quickly. To bring off rapid global deployments, for example, you must have standards, but standards are not to be had when a category is brand new. So the



market standardizes on the market leader's architecture, making it the de facto standard.

If that architecture is proprietary, as it was in the case of Intel, Microsoft, Cisco and Novell, then the market confers a tremendous competitive advantage on that vendor. It becomes virtually impossible for any rival architecture to succeed. Thus Motorola's 68030 chip, IBM's OS/2, Wellfleet's routers and 3Com's (later to be Microsoft's) LAN Manager all got squeezed out of the market. Business has no time to wait for the development of a competing standard.

COMPANIES THAT HAVE PROPRIETARY ARCHITECTURAL control over a product that has high switching costs are gorillas. We advise CIOs to follow the same rule we offer investors: In a gorilla-game category in enabling technology, once you know who the gorilla is, bet heavily on it and withdraw your support from all of its competitors. This is the domain of what economists now call the law of increasing returns, which states that as a company gains market share, its power and profits increase, rather than decrease, with each additional percentage point of share.

This is a fairly rare occurrence. The more familiar law of diminishing returns usually occurs, and it has a natural curbing effect on monopolies. Compare Microsoft's position in the NT server space, for example, with Compaq's in the PC space. Both are market leaders, both are providing enabling technologies, but Compaq does not have proprietary architectural control over the PC. It is not a gorilla. Dell, HP or IBM can always field a directly competitive offer. Because switching costs for PCs are relatively modest and low-cost clone companies can sell products at prices that, if Compaq matched, would decrease Compaq's profits, it is possible for a customer to bargain with Compaq, a king. On the other hand, a CIO who bargains with Microsoft in the NT server space does so knowing that if he

finally opts to take his business elsewhere, he does so at an enormous switching expense and risks going to a vendor whose platform may shortly become incompatible with industry standards.

The rule for CIOs is plain. Bargain with kings and do business with their lesser competitors—princes—but once you have committed to a gorilla company's architecture, you cannot realistically switch away.

And if you commit to the chimp instead, you will have a rough road ahead. As a chimp's customer, you quickly learn what happens when the marketplace commits to one company's architecture and you are on another. Every year, your set of options gets smaller, and the industry standard infrastructure gets stronger, broader and cheaper. The key to avoiding a singularly painful experience is to postpone commitments until you are sure who the gorilla is.

Not all gorilla games have a pure winner-take-all structure. Within the category of gorilla vendors, there is a strong distinction between application vendors and enabling technology vendors. Virtually all applications have significant proprietary content, which makes for high switching costs. Nonetheless, the power of an application gorilla is much less than that of an enabling technology gorilla because the market can support multiple gorilla-class application vendors with relative ease.

Among ERP applications, for example, SAP is clearly the gorilla, but PeopleSoft, Oracle and Baan all have strong offerings. And if you go down a tier, companies like Lawson, J.D. Edwards, QAD and Symix all have sustainable, growing businesses. The gorilla in an applications domain may get preferential treatment, but it cannot eradicate its competition the way NT is eradicating Novell's LAN OS or Windows eradicated OS/2 and the Macintosh OS. CIOs can choose applications from a much broader field of candidates and pick a second-tier vendor with confidence wherever its functionality or focus is a better fit with their companies or industries.

Three Rules to Remember

- Don't commit to any technology until after it has crossed the chasm.
- Use normal rules of engagement when dealing with enabling technology kings and princes and application companies of any size.
- Wherever there is an enabling-technology gorilla, get on that bandwagon and no other.

Finally, a quick way to learn which companies are which is to track the market capitalization of your vendors compared with the other companies in their category. If they are at the head of their pack, you can be reasonably assured of an ongoing stream of investment in the product line. If they fall to the rear, you need to be increasingly circumspect in making future commitments. Stock market valuation, after all, is simply the reflection of a whole lot of investors' best guesses as to future competitive conditions in your vendors' market. Their judgment is no substitute for yours, but it is worth paying attention to. **CIO**

Geoffrey Moore, chairman of The Chasm Group, can be reached at 650 312-1940 or at gmoore@chasmgroup.com.

Editor's note: Stay tuned for more. The Aug. 1, 1998, issue of *CIO* Section 1 will feature a special section on managing relationships with IT vendors.



Business can eat you alive. Especially if your data is the appetizer. So protect yourself. Look for "DLTtape™" or the authorized DLTtape logo mark on all your backup drives and media. It says you're working with the true DLT standard. And it says your DLTtape drive warranty will stay afloat. So get all the details at www.DLTtape.com. You'll discover the one backup system that really has teeth.

DLT II

4157

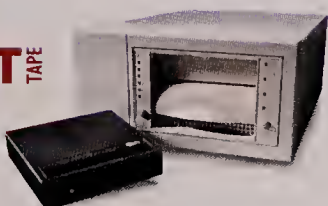
4157

DLT II is a trademark of Quantum Corporation.



Protection from the unimaginable

DLT
TAPE



Sell Yourself

You may have a terrific IS organization, but if you are missing a marketing plan, how will anyone else know just how much your IS group can do?

BY CLAIRE TRISTRAM

Charles Williams, vice president of information resources, knew he was in trouble his first day on the job at Georgia-Pacific Corp. when he picked up his telephone and waited 15 seconds for a dial tone.

"We were in bad shape," says Williams, who joined the Atlanta-based forest products company in 1993 as its director of enterprise network services. "We had 23 separate data networks. Each group had built its own network, with its own IT staff and support staff. Anytime you tried to cross a boundary, it didn't work."

Today Williams points to Georgia-Pacific's citation in the 1997 CIO-100 as evidence that the company has turned that situation around (see "Leaders in IT Excellence," CIO, August 1997). Williams claims the turnaround wasn't caused by technology—it was marketing. Borrowing an idea from his former employer,

The Walt Disney Co., Williams and the company's Information Resources group developed a detailed marketing and services plan for managing long-term technology projects and daily operations. The goal was to get Georgia-Pacific's divisions, long accustomed to complete autonomy in their technology decisions, to want to do business with the IR group again. And it worked.

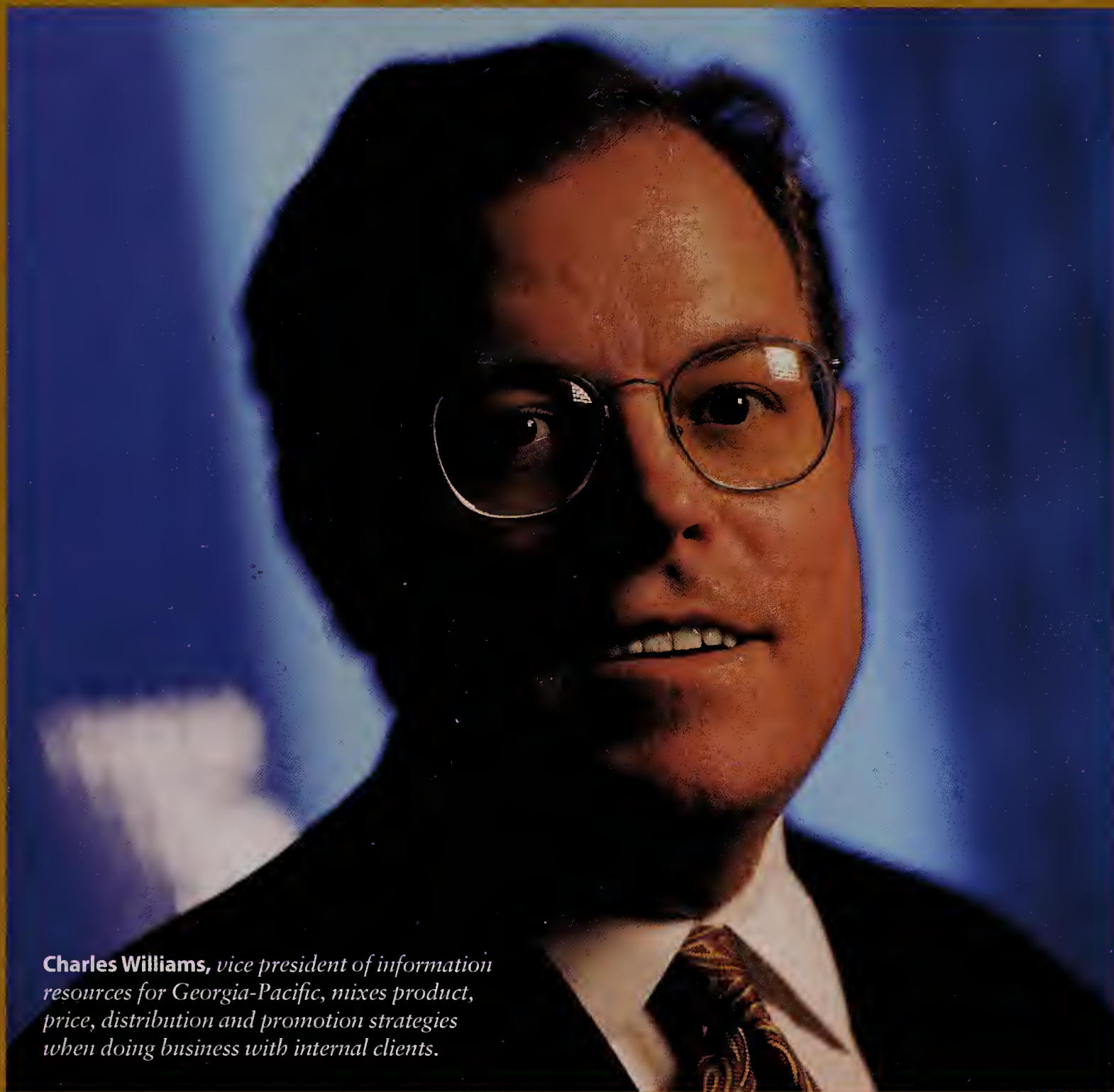
"Things got better in a hurry," says Roger Grahl, group director for Georgia-Pacific's paper divisions and an internal client of Williams' IR organization. "I saw big improvements virtually overnight—so much so that we pulled projects we'd given to external integrators back into the company."

The concept of being a service organization and the need to treat employees as clients are well understood by CIOs. As familiar as that message is, though, it has been difficult to implement. How can any IS organization have time for soft skills

Reader ROI

YOU CAN'T DO YOUR COMPANY MUCH good if you keep your organization's skills a secret. Read this article to learn

- ▶ How to define your services
- ▶ How to demonstrate your value
- ▶ How to organize your marketing team
- ▶ Why you need to overcome marketing shyness



Charles Williams, vice president of information resources for Georgia-Pacific, mixes product, price, distribution and promotion strategies when doing business with internal clients.

when there's real work to be done?

At Georgia-Pacific and other IS organizations, the answer to that question is the discipline of marketing. The cornerstones of marketing theory—how to mix product, price, distribution and promotion strategies—are the foundation for a new way of doing business with internal clients.

"If your reaction is that it's not your job to do marketing, my answer is that you're already doing it," says Anita Leto, senior consultant for Ouellette & Associates Consulting Inc., a consulting company based in Bedford, N.H., that assists companies in building and marketing a client-focused IT culture. "What your people say in meetings sends a marketing message. What they say in the elevator sends a marketing mes-

sage. You can bet that outside vendors have a methodical approach to the message they send, and you've probably noticed that the business side of your company eats it up."

Define Your Product

The first cornerstone of any marketing plan is to identify your product or service in a way that is meaningful to your clients. This doesn't mean writing an unintelligible mission statement that no one reads. It means giving your clients a clear understanding of what you do for them and reinforcing that message in every client contact.

"CIOs in general are not aware of the impact their organizations have," says L. Paul Ouellette, founder of Ouellette &

INTERNAL MARKETING

Associates and author of *How to Market the IS Department Internally: Gaining the Recognition and Strategic Position You Merit* (Amacom, 1992). "Last week I worked with an organization of tremendously hard workers. Most were working 60-hour weeks and had been doing so for 12, 15, 18 years. But the survey we did showed that clients would drop them in five minutes for someone who just gave them the feeling of being more responsive. The organization had done a terrible job in creating an awareness of their value."

Like any successful company, as an information executive you need to choose a product message that communicates what you do best. Don't try to send the message that you're high-end consultants when what you're really good at is reactive problem solving. Your message should be consistent, communicated by every member of your organization and visible on every memo, Web page and newsletter your organization creates.

"We wanted to present ourselves as being the best at operational excellence, of making things work smoothly," explains Susan Greger, director of utility project services, who helped write Georgia-Pacific's first marketing plan in 1993. "We weren't bleeding edge. We didn't try to present ourselves as experts in emerging technologies because that's not what the company needed. We were problem solvers. We wrapped that message in a commitment to excellent service."

At Hagerstown, Md.-based Allegheny Power, a utility that services five Middle Atlantic states, the IS organization has distilled its product message down to three words, emblazoned

on its logo: experienced, responsive, dedicated. Jerry Sefcheck, director of information services, wants those words to mean as much to his clients as the swoosh on your 9-year-old's sneakers means to everyone on the playground. "Our actions should speak louder than words, but the fact is we needed to sell ourselves a little bit," Sefcheck says. "We've been experienced, responsive and dedicated all along, but I think it helps to put out our chest a little bit about it. Anytime people see our logo, they connect it with the service we're trying to provide."

Like any Madison Avenue campaign, your product mes-

"If your reaction is that it's not your job to do marketing, my answer is that you're already doing it."

-ANITA LETO

sage needs to have time to develop. "Our advice is to stick to one message and not to change too quickly," Ouellette & Associates' Leto advises. "Focus your message, and stay with it for a couple of years."

Demonstrate Value

The second cornerstone of any marketing plan is price. In the context of marketing your IS organization, price can be defined as the notion that the value you bring to business is greater than its cost. "Internal IS organizations need to ensure that their costs are competitive with outside service providers," says David Kahl, program director for GartnerGroup Inc.'s IT Executive Program in Chicago. "And much like [retailers], which are experts in marketing, IS should publicly disclose its fees as compared with the competition. When the value delivered is consistent with the price being charged, then IS is competitive."

At Allegheny Power, the IS organization's pricing strategy took the form of detailed service-level agreements with many of the business units it services. Employees calling the help desk, for example, can choose what level of service they require. If the problem needs immediate attention and the call is made during normal business hours, IS employees are required to respond within 15 minutes and resolve the problem within an hour.

"People were afraid that clients would misuse that, but we haven't found that to be the case," says Amy Petrillo, an internal business consultant with Allegheny Power's IS organization. "When clients have a clear understanding of costs, they don't necessarily want to pay for 100 percent responsiveness. We give them the choice."

A detailed pricing strategy is all the more critical for long-term projects, particularly those that have the potential to run overbudget and past project deadlines. Frequent updates and negotiating with your internal clients before committing to increased costs will go a long way toward

Jerry Sefcheck, director of information services at Allegheny Power, advises his organization to sell itself a little bit.



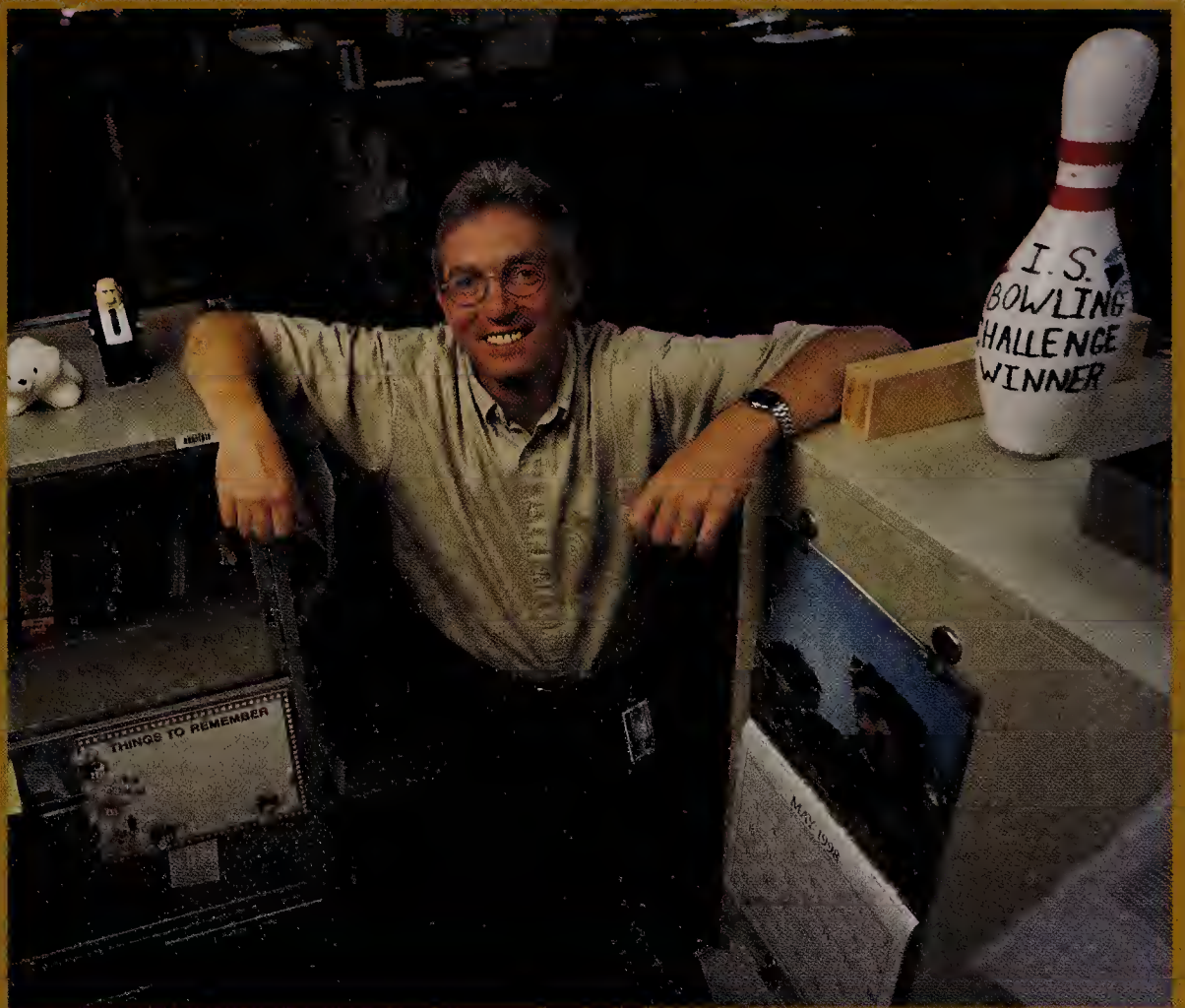
making even overbudget projects successful in the minds of your clients. "IS managers usually have a very strong sense of integrity, so they end up bashing themselves when projects go overbudget," Leto says. "A marketing approach would be to say, 'We're going to go over our budget, and this is why it's good for the company.' It's a way to still have integrity but to say things in a positive way so that things go forward."

Organize a Marketing Team

The third cornerstone of any marketing plan is a distribution strategy: Through what means are your clients going to access the services you provide? While every IS organization invests in a variety of channels through which their clients do business, a marketing approach to IS management would evaluate each of these channels from the client's point of view. "Internal IS organizations must make themselves and their services as convenient to use as outside vendors have made their products and services," advises Kahl.

In addition to using customer feedback to improve the effectiveness of help desk personnel, application development teams and onsite support people, Georgia-Pacific and Allegheny Power both have reorganized to support their marketing plans and in many ways resemble marketing organizations more than typical IS organizations. Each has created a management

Bob Kreha, who consults for Allegheny Power's IS organization, makes clients feel their needs are understood.



team whose sole responsibility is to manage internal client satisfaction, similar to the way account managers monitor a company's high-end accounts.

IS account managers often spend more time in their client organizations than in their own. They attend their client organization's staff meetings and often have a desk at their client's

Garnering Ink

Many IS organizations have found that positive press from outside the organization improves their status in the company

YOUR MARKETING EFFORTS shouldn't stop with your internal clients. Not only do you want the word to get around inside, but good coverage outside your company may help retain and attract top employees. "The more information services organizations can create positive light for themselves in the press, the more people will want to work there and the stronger the organization becomes," says David Kahl, program director for GartnerGroup Inc.'s IT Executive Program in Chicago. "It's self-perpetuating."

If you're new to the idea of seeking press coverage for your IS organiza-

tion, here is the collected wisdom of some of the best public relations experts in the business.

1. Work with your experts. Make sure your public relations department is involved with your publicity efforts. Many IS organizations seem to think of their public relations experts as obstacles, when they are really the best people to help you target your message, to find the appropriate editors and writers to listen, and to make sure your message reflects the position of the company as a whole.

2. Target your market. Develop press contacts that best serve your business goals. Having a personal relationship

with the editor of a small trade magazine in your field might count for more than 100 press releases to larger, less-focused magazines. A reporter's attention span is sometimes as short as the next deadline, so the more you can do to target your message to a publication's particular needs, the more chance you have of seeing your story featured.

3. Don't say anything you don't want to see in print. If you're being interviewed and you suddenly feel you're headed into shaky ground, take a deep breath, take your time and start speaking only when you feel you are certain of the facts.

—C. Tristram

INTERNAL MARKETING

location. Like any good account manager within a marketing organization, IS account managers succeed by understanding clients' needs and by providing services that meet those needs. Their goal is to develop a long-term relationship with clients based on mutual trust and respect. Whether they carry the title "account manager," "client services manager" or "business consultant," as they do at Allegheny Power, their role is to make clients feel their needs are understood.

"I see myself mostly as a facilitator," says Bob Kreha, a business consultant for Allegheny Power's IS organization. "I get the right people in touch, I minimize frustration and I make sure the image of IS is responsive. I'm in the business of getting away from the old idea of IS, that if you ask them for something, they take two or three years. I come back to IS and remind them that there are real people with real needs out there. It's no different than if we were dealing with the public at Sears."

Georgia-Pacific characterizes the role of its account managers as "soft sell, long term," a marketing strategy for high-end customers. The Information Resources organization has put its best people in the role, many of whom command six-figure salaries. The sales approach is so subtle that Williams' internal clients rejected the term "marketing" when asked to describe their relationship with the corporate IR team.

"There was a time when we had a very adversarial relationship between corporate services and the divisions," says Georgia-Pacific's Grahl. "It's not that way anymore. I prefer to think of it as a partnership rather than an [adversarial] customer-vendor relationship. We have a much stronger relationship than that."

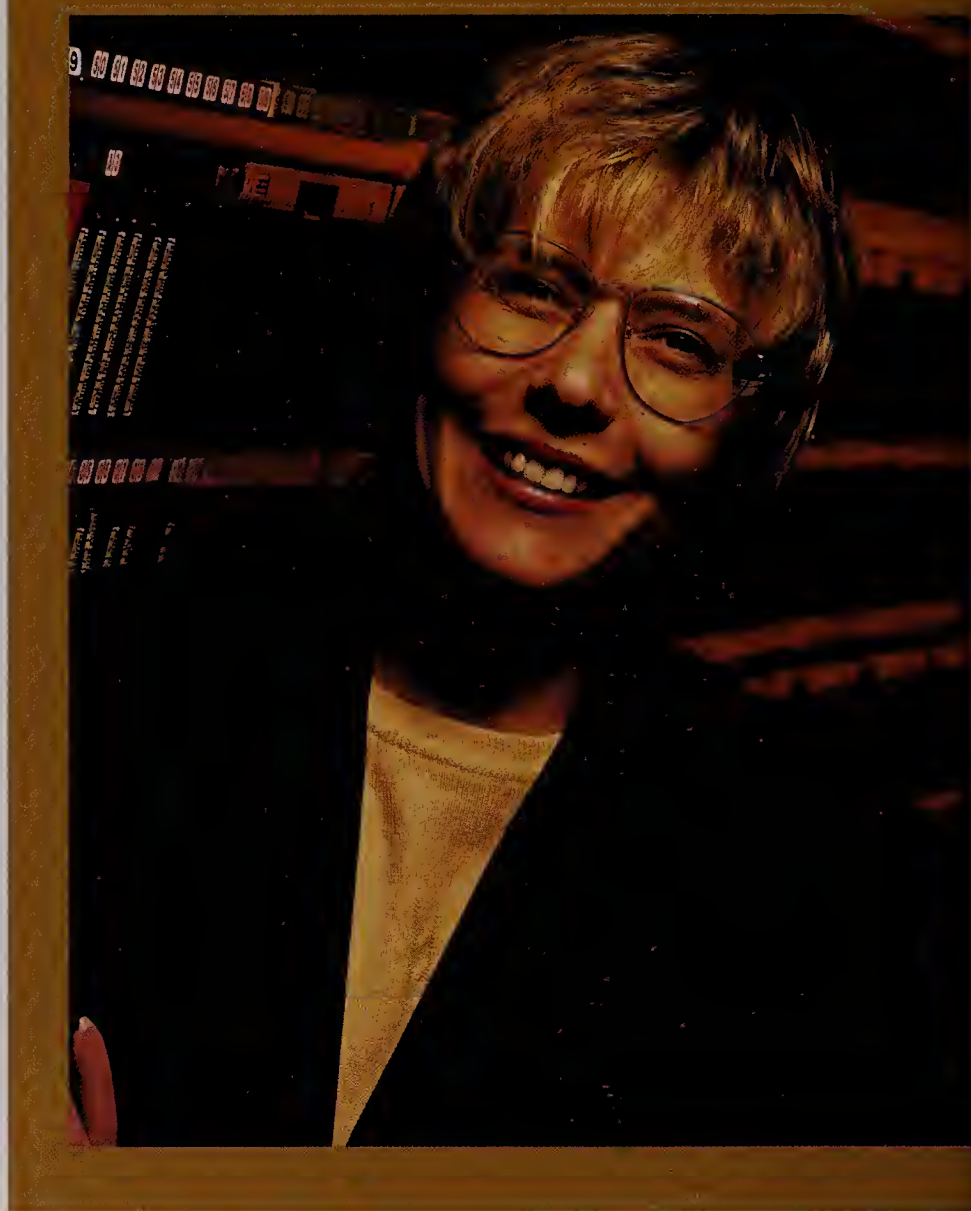
The most immediate benefit of creating account managers within the IS department is the sense clients get that IS really does understand the needs of the business. "In the old manner of doing things, IS focused on systems rather than on customers," says Tom Kloc, controller for Allegheny Power. "Now there is a huge focus on customers and their needs. My business consultant [from the IS department] has a major responsibility for understanding my needs. She participates in my staff meetings. She even sees things that aren't working together well across locations in my department and finds solutions. She proactively recommends what resources IS has to help me be successful."

Promote

Promotion plans ensure that the IS organization will communicate to every constituency that has a need for its services. The promotion plan usually entails a mix of strategies, depending on the urgency of the message as well as the managerial level and technology needs of the client.

You might already be promoting your organization, using such diverse channels as technology fairs, T-shirts, monthly newsletters or a particular Web page, but unless these tactics are grounded in a focused marketing message, you're probably missing the target, advises Leto. "A lot of our clients use these promotional techniques, but they don't focus the message. You need a methodical approach, not just, 'Quick, we need a brochure.'"

The biggest obstacle to a successful promotion might well be your own employees—and it is with them that your promotion strategy needs to begin. "No matter how beautiful a plan you create, a single employee's comment in a hallway can undo it," Leto says. "You must communicate to your staff what the marketing message is. You need to do nitty-gritty



Amy Petrillo, an internal business consultant for Allegheny Power's IS organization, makes sure clients know the cost of help.

skill building on how they should answer typical criticisms. You need to get everyone involved."

And, of course, you need to wholeheartedly believe in your message for it to succeed. Becoming a market-driven organization requires a profound shift in thinking for many CIOs, from an emphasis on technical excellence to a realization that their internal clients' perception of the IS organization is at least as important to their success as technology.

"I'll be quite honest with you, I was uncomfortable with the whole notion of marketing," says Allegheny Power's Sefcheck. "Our whole culture went against it. We took for granted that we didn't need it. But I finally came to the realization that to get back to the people who had an outdated impression of us, we needed to learn how to sell ourselves."

Sefcheck's feelings are typical: There appears to be widespread lack of comfort among CIOs about the need to market, even among those IS organizations that are doing it. It's a feeling Ouellette says CIOs need to overcome if they ever expect their organizations to become true service organizations. "When I ask CIOs what they think about marketers, they tell me that they don't trust them," he says. "But marketing truly is simply creating an awareness of value. We all generate impressions. Don't blame your clients for having the wrong impression of you. That's your problem, not theirs. To create a good impression takes effort. It takes a disciplined thought process. It takes new skills. It takes marketing." **CIO**

Claire Tristram, who writes frequently about the business of technology, can be reached at tristram@concentric.net.



We know your window to the future depends a great deal on where you've been. A tape backup solution can't ignore your investments in platform, software and media; or it's no solution.

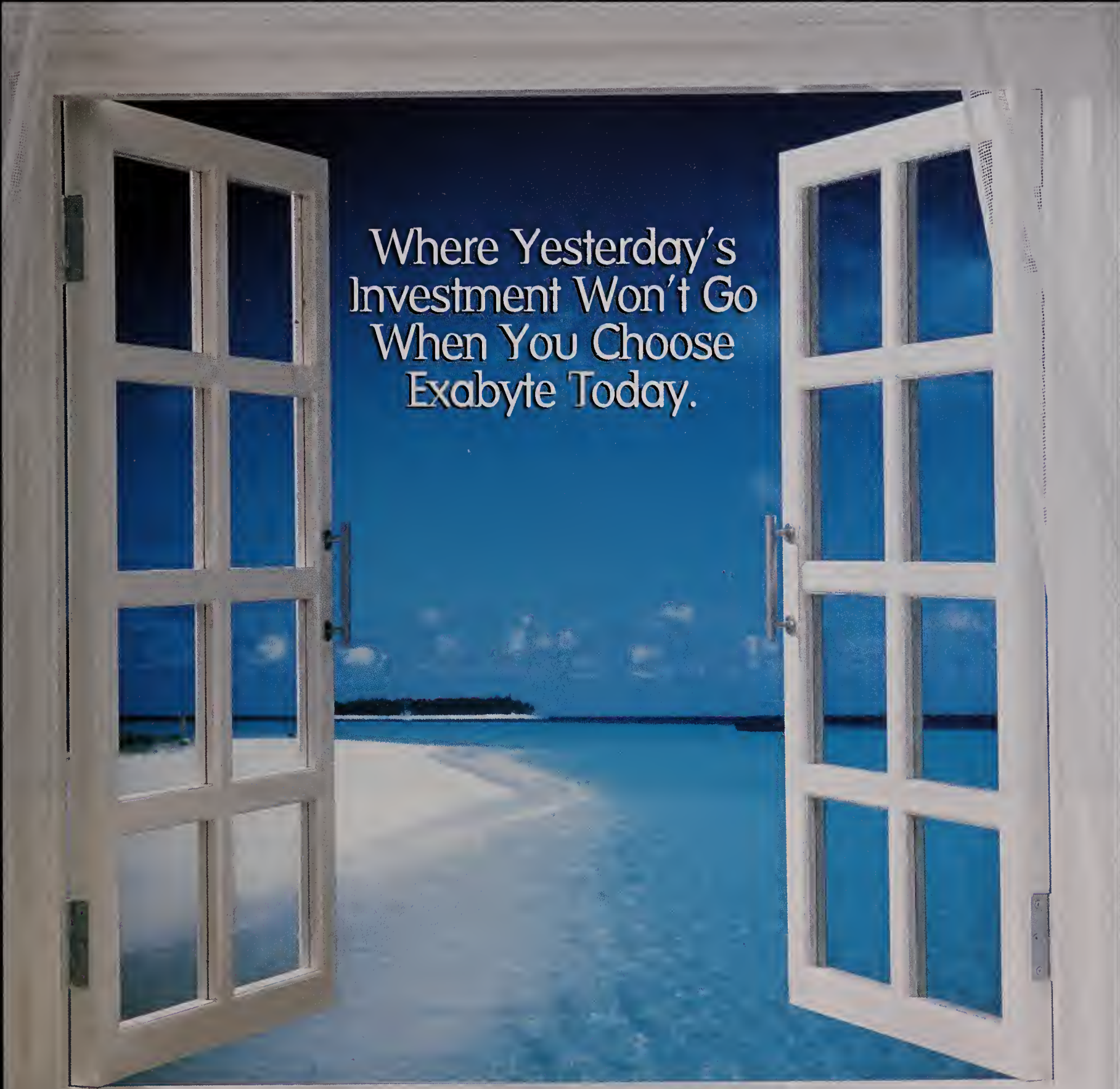
If you've invested in 8mm, we've got you covered with industry-leading automation

and an aggressive, compatible roadmap in Mammoth technology; if you are using DLTtape™, we're the choice for superior automation there, too. Plus we offer service and support that's second to none. Take a look at Exabyte... you'll love the view.

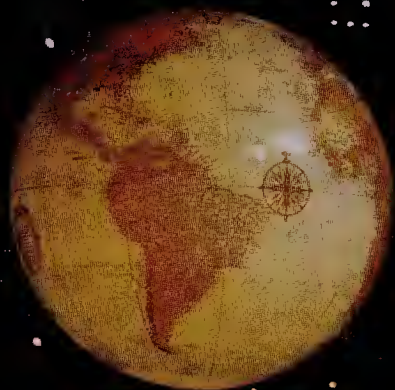


Exabyte®
every day. every time.

www.exabyte.com



Where Yesterday's
Investment Won't Go
When You Choose
Exabyte Today.



FOCUS

NUMBER

SERIES

COMPANY

POSITION

NAME

"YOU'VE GOT THE WHOLE WORLD IN YOUR HAND BECAUSE

NET PROFILES

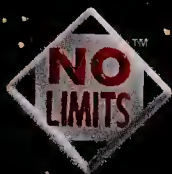
MARK WIESENBERG

052

DIRECTOR, COMPUTER SERVICES

NETWARE
NOVELL DIRECTORY SERVICES

QUALCOMM



DETAILS

© Copyright 1998 Novell, Inc. All rights reserved. Novell and NetWare are registered trademarks and Novell Directory Services and No Limits are trademarks of Novell, Inc. in the United States and other countries. QUALCOMM is a registered service mark and registered trademark and Q is a trademark of QUALCOMM, Incorporated. The stylized Q logo is a trademark of QUALCOMM, Incorporated. Options depend on services available for your carrier. All other names are registered trademarks or trademarks of their respective owners.

"WE'VE GOT OUR WHOLE NETWORK ON MY DESKTOP."

Mark Wiesenberg knows all about bringing things down to size.

His company, QUALCOMM, is putting the power of advanced digital wireless communications into the palm of your hand with its compact CDMA digital Q™ phone.

And his network, Novell®, is putting the power of seamless networking right onto his users' desktops.

Novell NetWare® software supports over 4,000 users on a single server, and scales up easily as 200 workstations are added every month. And Novell Directory Services™ technology allows his administrators to manage the entire network from a single site (including NT, Mac®, Sun® and UNIX® platforms).

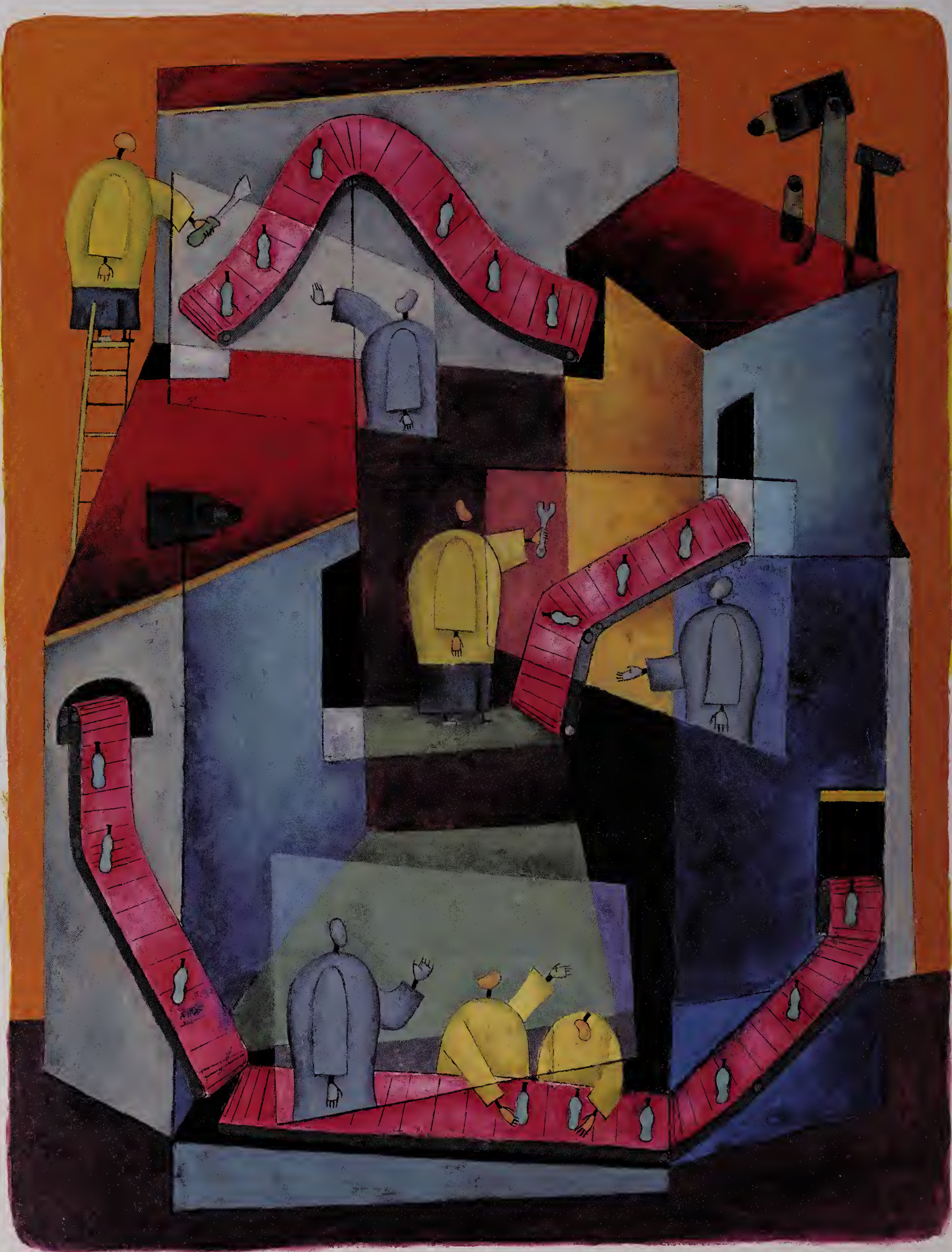
Shrinking the world is hard work, which is why a fast-paced, fast-growing company like QUALCOMM works only with the best. That's why they chose Novell.

World. Network. QUALCOMM. Novell. Hand in hand, desktop to desktop, a revolution in technology.

www.novell.com

Novell®

S O L U T I O N S



It's Not Just for Meetings *Anymore*

Videoconferencing can save you a few bucks on airline tickets, but do you know how to use this technology to enhance business functions?

BY MARK HALPER

IT'S A LONG WAY FROM SOUTH AFRICA TO THE EAST COAST of the United States. But when Greenville, S.C.-based packaging equipment maker Hartness International wanted to show off its eight-armed packaging machine to Johannesburg-based The South African Breweries Ltd. in January, the distance proved hardly formidable. Using videoconferencing technol-

ogy and cross-hemisphere ISDN phone connections, Hartness televised its Octopack machine neatly slipping bottles into cartons on a conveyor belt in Greenville. Rather than reserving transatlantic plane and hotel berths for a team of five from the brewery, Hartness made a much less expensive booking for this show: videoconference room space for

Reader ROI

DISTANCE IS DYING AS DATA TECHNOLOGIES advance. Now, video is entering the picture. Read this article to find out how videoconferencing

- ▶ Works as an interactive sales medium
- ▶ Keeps skilled, technical repairmen off expensive, last-minute intercontinental flights
- ▶ Increases the effectiveness of physical security operations
- ▶ Expands the reach of some "hands-on" operations such as medical treatment

VIDEOCONFERENCING

four hours in Johannesburg and \$600 hourly ISDN and long-distance rates charged by the South African originator. No one had to leave his hometown, let alone cross the ocean.

"Instead of spending \$20,000 or \$25,000, we spent about \$2,400," says Norm MacDonald, director of sales for Hartness Technologies, a division of Hartness. That's pretty good economy, considering an Octopack sells for about \$250,000.

Long beset by quality problems that have relegated videoconferencing to a marginal corporate role supporting internal meetings and training sessions, the technology is beginning to work its way

into operational assignments of selling, servicing, diagnosing and trouble-shooting. Several factors, including declining prices, standardization of protocols, compression advancements and faster corporate networks, are contributing to video's emergence from the meeting room to the front lines. (See "Moving Pictures Go to Work," Page 72.)

But first, a word of caution. Despite these strides, videoconferencing is not likely to soon enjoy the ubiquity of the Web, the spreadsheet or the word processor (see "Sobriety Check," this page). Sobered by years of lukewarm market acceptance, even vendors acknowledge that not everyone needs videoconfer-

encing. "There are certain types of transactions where having video provides no benefit," says Scott Darling, general manager of Intel Corp.'s Hillsboro, Ore., business communications product organization, which produces Intel's ProShare videoconferencing system. Another reason for videoconferencing's limited application is that the technology is still far from perfect. A video transmission from down the road can look as bleached and grainy as a broadcast from the space shuttle and be equally prone to disconnecting. Latency, the annoying lag between when words are spoken and when lips move, can plague even the fastest links. Because

Sobriety Check

Is videoconferencing mature enough for your company?

WHILE VIDEOCONFERENCING QUALITY HAS MADE GREAT strides during the last couple of years, buyer beware. Even some of the fastest connections can fail to deliver a broadcast-quality video, generally considered to be 30 frames per second.

Viewers usually tolerate some latency—the strobe-light effect that can make the medium look like a clumsy flip-the-pages picture book movie. Most manufacturers claim six ISDN lines—which translates into 384Kbps—will deliver 30 frames per second. "In your dreams," scoffs Dr. Larry Mendel, medical director of the Ohio Department of Rehabilitation and Corrections. The Ohio prison system uses videoconferencing to examine inmates and even at the partial T1 speed of 768Kbps tolerates minor latency.

Latency worsens as bandwidth declines. Desktop conferencing can end up running over dial-up modems or even over plain old telephone service (POTS). On a 28.8Kbps modem, Microsoft's NetMeeting software delivers a small picture between three and seven frames per second, says Lead Product Manager for NetMeeting Brent Ethington. At that rate, "you can hardly see the person," quips industry analyst Bettina Tratz-Ryan of Dataquest, a company of GartnerGroup Inc. in Stamford, Conn.

Picture quality aside, connections can falter. Most users keep technicians on hand to make sure video links work smoothly. Dataquest's Tratz-Ryan notes that anytime a session requires "bridging" from one network to another, lines can drop. Many users experience difficulty purchasing ISDN lines. Debbie Deans, vice president of Houston-based security firm InterStar Systems Inc., calls ISDN installation "a nightmare."

And now for the good news. Many systems are geared to ISDN today because the International Telecommunications Union's (ITU) H.320 standard for ISDN has led to interoperability among vendors. The Geneva-based standards body has approved a standard for building systems that run on IP protocols—the protocol of LANs and the Internet—and manufacturers are expected to advance their IP models during the next several years. Furthermore, the ITU has also approved a standard that prescribes data and application sharing over videoconferencing systems. This T.120 standard means viewers can swap data over their video screens regardless of which software program they run. And finally, video is benefiting from the infrastructure upgrades that many companies have implemented to support ambitious data projects.

—M. Halper



these shortcomings are not as severe as they were two or three years ago, IT departments and end users are beginning to do as sports broadcasters do: "Let's go to the video." In addition to Hartness and other companies that have tapped into videoconferencing as a sales medium, the medical profession is using video to diagnose and, in some cases, treat patients in remote areas. Manufacturers are installing video equipment on shop floors to help fix and maintain machinery. Security companies use videoconferencing equipment to help deter crime.

Sales and Service

As a sales tool, videoconference demonstrations cannot provide the tire-kicking

and grocery chains, uses cameras at its storage and sorting sites. Hapco provides potential customers a view of its Pittsburgh and Pompano Beach, Fla., operations, addressing such concerns as the ripeness of the produce or the care the company takes in handling and packaging it. The system shows, for instance, whether sorting machines are bruising apples or whether broccoli has turned yellow.

"With video, you can see how fruit reacts when you push on it," notes Jennifer Judge, controller of Hapco's Pompano Beach operation. "With still photos, you cannot." Gabriel Tang, Hapco's director of IT and telecommunications networks, says Hapco

one had to book a last-minute, \$4,000 overseas flight.

Telemedicine

The medical profession has long faced the dilemma of how to attract skilled, capable physicians and specialists to outlying areas. Videoconferencing is helping to solve the problem. The state of Ohio has installed video equipment in 20 of its prisons and plans to implement videoconferencing throughout the system, which serves 48,000 inmates in 30 prisons. When inmates are referred to specialists, doctors at The Ohio State University Medical Center in Columbus conduct some of their initial and follow-up examinations

"Our savings will not just be travel money saved but will also come from a decrease in recidivism."

- ED WHITE

possibilities of a test drive. But Hartness's MacDonald points out that because videoconference demonstrations are live, potential customers trust them more than they do a prepackaged sales video or still photos. When Hartness trains its video cameras on its machines in Greenville, beaming live images around the globe, customers "get to see our equipment, warts and all," says MacDonald. "If we start dropping bottles, they get to see how we shut down and start up again."

Hartness CEO Bern McPheely saw so much potential with videoconferencing that he formed a division to enter the video business in January 1996. The division, Hartness Technologies, assembles and installs video systems for other manufacturing companies. MacDonald says the division hopes this year to account for 10 percent of revenues for the privately held, 25-year-old company that had sales above \$40 million last year. Hartness Technologies doubles as a support group in-house, helping Hartness use videoconferencing for its own sales initiatives, such as with South African Breweries.

Another of Hartness's video customers, Riverhead, N.Y.-based Hapco Farms Inc., a national fresh produce importer and distributor to supermarket

occasionally makes spot sales in this manner, as customers looking at one product see other products they decide to buy, "like shoppers at the checkout line in a supermarket."

McPheely started Hartness's service department using video technology in fall 1995, before the company applied the technology to sales. "We would travel cross-country for what could turn out to be a 10-minute repair," says MacDonald.

Hartness cut travel in its service division by dispersing tripod-mounted or hand-operated cameras throughout its machinery customers' plant floors. The Hartness setup includes audio connections that allow the Greenville engineers to direct a plant employee to refocus a camera and explain or repair a problem. Hartness assuages any concerns that workers may feel spied on by emphasizing that the cameras watch machines, not people. When Heineken NV complained that Hartness machines were tearing apart beer cartons at a new plant in Zoeterwoude, The Netherlands, last fall, a group of Hartness engineers in Greenville diagnosed the problem within 20 minutes of a video session. The company shipped a new part overnight, in time for Heineken to resume plant operations on schedule the next day. No

using the videoconferencing system.

Dr. Larry Mendel, medical director of the Ohio Department of Rehabilitation and Corrections, explains that in the past, prisoners traveled to Ohio State University for exams, which cost the state an average of \$100 per inmate. An overnight stay meant paying \$300 to post a guard in OSU's inmate hospital ward. Factoring in the cost of the video equipment and T1 lines, Mendel estimates that 2,613 video exams saved the state about \$150,000 last year.

Better yet, the video system has also improved certain treatment aspects. For instance, it has enhanced communication with patients. Mendel points out that zoom cameras and 27-inch screens can enlarge a patient's face to twice its size. "It's like being five inches away, so it's easy to pick up the nonverbal cues," he says. Dr. Louis A.D. Violi, a pulmonary fellow at Ohio State, says a hospital survey revealed that inmates feel as adequately cared for by the video system as they do by in-person visits. In fact, many report a "slight advantage" with the video system.

Violi recounts one instance in which the video system may have helped prevent a potential outbreak of tuberculosis. Last fall, he says, when specialists in

VIDEOCONFERENCING

Columbus detected the disease in a video of a culture taken at North Central Correctional Institution in Marion, they immediately isolated the patient to prevent spreading the highly contagious disease. Without video, it would have taken longer for the specialist to view the cul-

care physicians, lack of touch would be a serious detriment, and for that reason, Ohio still uses in-person examinations for checkups, says Mendel.

The telemedicine practice has so impressed Ohio Department of Rehabilitation and Corrections Director

training. In all three cases, the department is tapping the medical group's videoconferencing equipment. Funding for additional equipment hinges on the success of the vocational training program, says White, who estimates costs of about \$9 million over four to five years. "But that

With video and audio interaction, security officers at a central location can determine if anyone tampers with the safe or if a bona fide would-be robber has tripped an alarm.

ture. The patient benefited by promptly receiving medication, says Violi.

Video treatment does entail at least one major disadvantage. "There is not enough hands-on," says Mendel. "You can't estimate the size of the liver or push to see where the pain is." But that shortcoming affects specialists less than it does doctors who provide routine physical checkups. For those so-called primary

Reginald Wilkinson that he has sanctioned Ed White, chief of the bureau of information and technology services, to pursue other videoconferencing applications. White says the department has three pilots underway: one to cut down on travel by parole board hearing officers, another to facilitate job interviews for inmates nearing the end of their prison terms and a third to provide vocational

doesn't include our savings, which will not just be travel money saved but will also come from a decrease in recidivism," White notes. The department also hopes to eventually use videoconferencing to allow inmates to "visit" family and friends and to sell and market prison products such as license plates, highway equipment and office furniture, according to White.

ODDLY ENOUGH, THE ONE ON THE RIGHT COSTS LESS.

The HP NetServer LXr Pro8 with Intel® Pentium® Pro processors running the Enterprise Editions of Microsoft® Windows NT® Server and SQL Server is not only more powerful, it's less expensive. It can perform 40% more transactions per minute and costs 40% less per transaction* than Sun's Ultra Enterprise 450 Workgroup Server™ running Solaris™, while supporting your enterprise mission-critical environments. Windows NT has all the application services you need built in, like a transaction-processing monitor and a fully featured Web server. And HP brings you the best service and support in the industry. All at a lower cost per transaction for performance you just can't outrun. For info: www.microsoft.com/backoffice/hp_ms.



Microsoft

*Based on TPC-C benchmark results on Model 300 1998. HP and Windows NT are registered trademarks of Hewlett-Packard Company. Microsoft, Windows NT, and SQL Server are registered trademarks of Microsoft Corporation. Sun and Solaris are registered trademarks of Sun Microsystems, Inc. ©1998 Hewlett-Packard Company. PTC300

Security

False alarms cost money. Typically, municipal police departments charge banks and other businesses fees that vary by jurisdiction, according to the International Association of Chiefs of Police (IACP) in Alexandria, Va. The IACP estimates that false alarms cost police departments \$600 million nationwide. With videoconferencing cameras on the premises at Houston-based Sterling Bank, Sterling's security provider, InterStar Systems Inc., knows immediately whether an alarm is the real thing. With video and audio interaction, InterStar security officers at a central location viewing an Intel ProShare system can determine, for instance, if anyone tampers with the safe or if a bona fide would-be robber has tripped an alarm.

Robert Lovelace, Sterling's director of security and loss prevention, says the \$1 billion bank has virtually eliminated police responses to false alarms at the 10 facilities where the system is installed, creating "significant savings." Furthermore, employees who open or close the bank

feel less vulnerable when they turn on the system for extra protection, and many customers who use automated teller machines appreciate the option of turning on a camera with two-way audio for additional protection. Constant monitoring would take up too much screen resource back at central, says Lovelace, so the bank opted for an "event-driven" system.

Sterling's videoconferencing system monitors its premises at night, alerting guards to rowdy trespassers who congregate in certain bank parking lots located near bars. In the past, these crowds have caused costly damage to the landscape and physical property. The videoconferencing system is a more effective deterrent than TV systems because InterStar security officers—typically off-duty police officers—announce their warnings through the remote audio system, threatening to tow cars. Trespassing declined after a few incidents in which a local wrecking company delivered on the threat, says Lovelace.

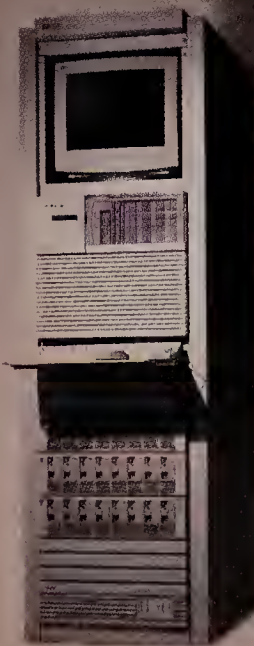
Sterling has derived other benefits from the system. The clarity of the pictures has helped identify check forgers, according to Lovelace. Glen Rust, vice president of operations and technology at Sterling, says the bank hopes to use the technology to control access to a 24-hour data center currently under construction.

InterStar provides the same services to a range of companies, including convenience stores, fast food chains, car dealerships, banks and furniture warehouses. Reactions to its live intervention can be unpredictable. "If it's weird, it's happened at 3 a.m. in a convenience store," says Debbie Deans, vice president of the Houston-based security firm. "Once one guy thought he was hearing voices, that God was speaking. He threw his beer down and said he was going home and never drinking again." **CIO**

Mark Halper is a freelance writer based in San Francisco. He can be reached at markhalper@aol.com.



Sun Ultra Enterprise 450
Workgroup Server



HP NetServer LXr Pro8 running
Windows NT Server



PENTIUM PRO
PROCESSOR

Big

Data is the biggest asset of the information age

Origin of the Business World

- Full 64-bit system hardware and software
- 2-64 GB/sec I/O bandwidth
- Up to 88 Fibrechannels at 100 MB/sec each
- 64 MB to 256 GB main memory
- Up to 400 Terabytes online storage
- Supports industry-leading database and storage management solutions



ORIGIN™ SERVER. SOLUTIONS FOR A BIG DATA WORLD.

Data is no longer simply text and numbers. It is exploding, growing more complex as it is collected, correlated, visualized and stored. It is expanding to include multi-dimensional datasets of graphics, audio and video.

Use it more effectively as it grows. Go to the Origin of servers.

Data

The Origin server from Silicon Graphics is the smartest choice you can make to create a data warehouse that can respond to the requirements of Big Data created by the information age. Store up to 256 GB of data in system memory. Avoid bottlenecks with 10 times the I/O bandwidth. Manage exponential growth with unmatched scalability.

Welcome the growth of data. The bigger it is, the stronger you'll be. That is today's Origin of success.

[www.sgi.com
/bigdata](http://www.sgi.com/bigdata)

at the core of your business



SiliconGraphics

Emerging Technology

THE STATE OF THE ART,
NEW PRODUCTS
AND STAYING AHEAD
OF THE CURVE

Edited by Howard Baldwin

Moving Pictures Go to Work

When it comes to marketing and training, video-on-demand is becoming easier to request

BY DAN SWEENEY

IN MOST U.S. SHOPS, GRAPHICS ARE SECONDARY TO text. And video, well, that's something you pop into a VCR, not broadcast over a network.

Not for Carl Banks. Where he works, image is substance—specifically, full-motion, high-resolution video that registers violent collisions of 300-pound linemen and graceful trajectories of quarterbacks' spirals. Banks, a former linebacker for the New York Giants and the Washington Redskins, is currently director of player development for the New York Jets Football Club. Game videos make up his corporate intelligence. Now, with the installation of the Jets' video-on-demand (VOD) network for accessing such videos, player development has become an online affair.

"Professional athletics has become one of the more information-intensive businesses today," says Banks from his car phone, using his celebrated dodging skills while navigating New York's congested streets. "In the era of free agency, it is vital to integrate the player into the team as quickly as possible, and that means communicating information quickly to the player. And from the management perspective, rapid access to information, particularly visual information, is crucial to the recruitment effort.

Our system serves both purposes."

You may be thinking, "Yeah, sure, the NFL has a bigger budget than I do," and certainly the Jets' VOD installation represents one of the earliest uses of the technology outside the video production arena. But it's not an isolated example. Video server technology, considered somewhat experimental as recently as two years ago, has become prac-



tical as manufacturers like Silicon Graphics Inc., N-Cube, Concurrent Technologies Corp., SeaChange International Inc., Sun Microsystems Inc. and IBM Corp. have designed their servers for multiple simultaneous transmissions at high continuous data rates. At the same time, on the network side, switched Ethernet and asynchronous transfer mode (ATM) installations provide the basic infrastructure for VOD.

Until 1996, VOD was strictly a niche concept. Broadcasters used video servers for commercial insertion during television broadcasts; some retail chains employed video servers in conjunction with VSAT satellite services for broadcasting in-store videos. But with the aforementioned improvements in storage and networking, VOD is taking its first tentative steps into the enterprise. (See "It's Not Just for Meetings Anymore," Page 64.)

Adventurous organizations with ample imaginations (if not budgets) are using the technology for training and educational purposes. While the U.S. military may be the leader in educational VOD systems, universities aren't far behind, employing VOD in distance-learning scenarios. In the corporate arena, Healthway Interactive Inc. in Austin, Texas, provides informational and educational services for hospitals with large patient populations and ongoing staff training needs. These organizations are in the vanguard of adding VOD to the enterprise as an adjunct to traditional training and marketing methods.

Lights, Camera, Action

Like most video-on-demand users, the Jets use a high-

IN THIS SECTION

Biometrics Follow-Up

Windows NT Security

Smart Cards Go Wireless

Y2K Across the LAN

Call Center Workflow

speed infrastructure—a combination fiber and coaxial backbone supporting Fast Ethernet speeds. A bank of Silicon Graphics Inc. (SGI) servers stores the videos on hard drives and transmits them to individual PCs across the network, where users access the videos in real-time through their Web browsers. The system uses custom video streaming software developed by Oracle Corp., though standard software is available from a number of vendors, including IBM.

This distribution network enables Banks to create what he calls an animated playbook. “Instead of giving the player a book to study at night and then trying to understand it the next day at practice, the video clips of the actual plays let him see exactly what he has to do,” Banks explains. A joystick interface allows the player to pause or advance onscreen action with Nintendo-like agility; he can even zoom in on the individual position he is studying. “We have PCs in all our classrooms, and they let the athlete play the game, not just study it. The players love it.”

The system is equally valuable to the team’s scouts, notes Banks. “You start with a profile or position you want to fill: height, weight, 50-yard dash time and so on. Then you call up the prospects in the database that fit the profile and watch clips of them playing their positions. It saves a lot of time.”

VOD also is a time-saver at the University of Texas at Arlington, one of the first educational institutions to adopt the technology. “We call it leveraging the professor,” jokes Pete Smith, director of the university’s Center for Distance Education, which installed the SGI-based system last year and administers it today. “The student can simply play the lectures back and review them without ever attending class, so class enrollment can be practically unlimited, which means more tuition dollars and more matching funds from the state. The system is more than paying for itself.”

The UT system runs over a dedicated Fast Ethernet connection from a server at the school’s technology center to students accessing them either on desktop PCs at the center or over the campus intranet. The supporting network is cur-

Security Sequel

The eyes have it, not to mention voices, fingertips and your entire body

ONE OF THE PITFALLS OF journalism is sending a story off to press and then discovering all sorts of cool information you could have included. Consider this look at some new biometric systems as an upgrade to Senior Writer Sari Kalin’s “From Sci-Fi to Security” (CIO Section 1, April 15, 1998).

BIOMETRICS FOLLOW-UP

You Do Need Your Stinkin’ Badges

Imagine an identity badge as an employee’s password. If the employee is near his computer, he can input data. If he leaves his computer, it’s locked.

RF IDEas Inc. (www.rfideas.com) and Ensure Technologies Inc. (www.ensuretech.com)

incorporate wearable devices that communicate via radio frequency technology with a transceiver plugged in to a PC running Windows 95 or Windows NT. RF IDEas’ \$295 Air ID incorporates two wireless transceivers, one in a badge and the other in a base unit connected to the serial port (additional badges are \$155). Ditto for Ensure’s \$179 XyLoc, except that one transceiver is in a pagerlike device and the other connects to either the keyboard or the Universal Serial Bus (USB) port. When the employee steps far enough away from the computer, it locks and a screen saver pops up. Presto, wireless security. Unfortunately, if an employee leaves his device next to the computer, it’s the same as leaving his password on a Post-it Note stuck to the monitor. If he forgets his badge, however, he can use an overriding password.



Face Facts

While some biometric security devices use fingerprints or voices, the \$150 FaceIt PC software from Visionics Corp. (www.faceit.com) makes users’ faces their fortune. With a camera attached to a PC running Windows 95 or NT, it verifies identity by matching a user’s facial features with a saved image. At the same time, the software can also record the visage of anyone who tries to tamper with the computer or even walks by. Visionics says the software can be set up so that the computer will offer different access levels based on whose face it approves and suggests that it can also be used for time and attendance validation and point-of-sale fraud.

Speak Up

Intelitrak Technologies Inc. (www.intelitrak.com) says its Citadel GateKeeper voice verification system can be used for network access. It

doesn’t matter whether the user is at his microphone-equipped PC or using a laptop and cell phone at any remote location, “including a sailboat or hot tub.” (Frankly, the last time I was in a hot tub, dialing into the corporate network was the furthest thing from my mind.) Voice is only part one of the access method, however. Once the user is authenticated, a random, single-use, time-sensitive password is generated and read to the user through a voice-response application. As long as the user logs on within one to five minutes, access is granted. The company’s basic model costs \$85,000; pricing for enterprise systems starts at \$150,000 and is based on the volume of calls per hour and the number of simultaneous users.

—Howard Baldwin

2
Visas

Departures/Sorties

-19 APR 1998-

WHAT IF YOU COULD KEEP TRACK
OF YOUR PCs ALL OVER
THE WORLD WITHOUT TRAVELING
ALL OVER THE WORLD?



*Starting U.S. street price. Monitor not included. †International Data Corp. Q4 1997 worldwide factory shipment results for leading PC manufacturers versus year-ago quarter. Intel Inside and Pentium are registered trademarks of Intel Corporation; Microsoft and Windows NT are registered trademarks of Microsoft Corporation. ©1998 Hewlett-Packard Company PPG503



*HP Vectra VL with Windows NT starting at \$1,309**

Gone are the days of airplane food, baggage checks and jet lag. Armed with HP Vectra TopTools running on Windows NT® Workstation, you'll never even have to leave your chair. Your department can instantly learn with a few clicks of the mouse what's where, which software is installed and whose machines are in need of immediate attention. Or find out up to 400 other items about the makes, models, speeds, types and settings of the PCs themselves. On thousands of machines simultaneously. No matter where they are: in separate buildings, different cities or even different parts of the world. In addition, the affordable HP Vectra with Windows NT offers scalability, reliability and security. What else would you expect from the fastest growing¹ PC supplier? For more information visit us at www.hp.com/vectra/wnt.

Emerging Technology

rently a closed system, with no access from off-campus or outside the dedicated network—with the exception of one remote site—though Smith says the administration is considering the possibility of additional remote sites.

Education doesn't just take place at universities, however. Some companies are using VOD to educate customers or staff. Healthway Interactive initially installed a SeaChange video file server and proprietary software in two hospitals that wanted to provide patients with a selection of prerecorded videos. SeaChange had developed its video file server for the television industry, and cable television and hotels were early users, but when Healthway investigated using the system in hospitals that wanted to show instructional videos for patient education, it developed software to facilitate the new applications.

It's not surprising that one of the largest VOD implementations in corporate America belongs to networking conglomerate 3Com Corp. at its Carrier Systems Business Unit in Skokie, Ill. "We initially used the network to distribute promotional materials and instructional videos to staff, but now we send out customer product [information] and other kinds of information as well," explains Michael Greene, manager of electronic marketing, who set up the network.

Adapting VOD to the Enterprise

The 3Com installation is unique in that it operates on SGI servers over the enterprise network, sharing capacity with files, Web servers, e-mail and still-frame graphics. According to experts, the biggest hurdle confronting widespread adoption of the technology is not lack of demand but rather the difficulty of adapting a corporate LAN or intranet to handle both real-time transmission of sound and image and traditional e-mail and file transfer applications.

The primary issue is speed. Digitally compressed MPEG-1 video, the same standard used in direct satellite broadcasts, requires a channel accommodating a constant 1.5Mbps throughput. This represents the full capacity of a single T1 telephone data line or about one-sixth the capacity of an ordinary Ethernet network, which means even a handful of simultaneous VOD users would swamp a LAN. To be usable, video has to have absolute right of way over other data, and because most LANs have no provisions for prioritizing data, traditional Ethernet is unacceptable.

To truly accommodate VOD, an ATM network is ideal. ATM was specifically developed to facilitate switched video as well as text traffic, and it allows for prioritization of data. ATM network performance is also highly predictable in the face of

LEADING

EDGE

Security Audit Software

IF YOU'VE SET UP SECURITY SYSTEMS USING Windows NT's internal tools, you know it can be a hassle. Centrax Corp. has tried to simplify the process with its **Centrax Audit Strategy Tool** (a.k.a. CAST), designed to ease the implementation of consistent security policies across an NT-based enterprise. As every security whiz knows, audit policies are system configurations that define the user, acceptable events and the scope of monitoring required for a given computer. Centrax has whittled down the required number of screens for developing security policies to just three.

CAST focuses on relevant events in order to filter the amount of data collected and disk space required to store monitoring results. The software provides 10 predefined policies for system, file and registry key auditing, and it allows administrators to create custom policies for enterprise- or organization-specific information. It also lets users save audit policies as templates for consistent distribution across multiple locations; these can be used in conjunction with Microsoft Corp.'s Systems Management Server and Tivoli Systems Inc.'s Tivoli Management Environment.

CAST is priced at \$395, \$895 and \$1,595 for 10-, 25- and 50-seat licenses, respectively. Larger enterprise licenses are also available. For more information, call 619 546-2400 or visit www.centraxcorp.com.



I Know You're in There

WE USUALLY TALK ABOUT PRODUCTS HERE, but there's a neat technology you should be on the lookout for. SCS Corp. and Maxell Corp. of America have created a "**contactless**" smart card. The card, only about one-quarter of a millimeter thick, incorporates a tiny integrated circuit that can be read by a radio-frequency scanner and holds 1,024 bits of information (about five times more than fits on the magnetic strip of a typical credit card). In addition, because it so closely resembles paper, the card can be run through a laser or bar-code printer, so the information can be read by scanners and by humans.

According to SCS and Maxell, applications abound in high-traffic transportation and shipping industries. A truck or palette full of packages could be scanned using the radio-frequency technology rather than running each package under a scanner. Attaching the smart card to an airline ticket could allow passengers to walk on board past a scanner without having an agent tear tickets. In addition, the technology could speed logistics, transactional, pharmaceutical and library applications.

The technology is currently being beta-tested and is available through systems integrators and OEMs. For more information, contact SCS at 619 485-9196 or visit www.scs-corp.com.



Y2K and LAN Applications

WHILE YOU'VE BEEN WORRYING ABOUT making the Cobol applications on your mainframe Y2K-compliant, you may have overlooked the potential Y2K problems elsewhere in your organization. If your users don't adhere to four-digit calendar structures in their desktop and local area network applications, it's possible that those applications are just as susceptible to date problems as your enterprise systems. IST Development Inc. has created a series of tools called **Year 2000 Packs**, designed to analyze and assess LAN and desktop applications and data for Y2K problems.

The Year 2000 Packs analyze spreadsheets, databases and source code generated by programming languages in distributed computing environments. From a single computer, the software scans files and directories across the network, producing reports that include guidelines on how best to use the information provided. The reports compile audit trails of files, denoting those with password-protected constraints.

Four packs are available. Century Pack: Microsoft Files covers Excel 4.0 through 8.0, Access 2.0 through 8.0 and FoxPro 2.5 or later. Century Pack: Lotus Files covers Lotus 1-2-3 spreadsheets, Approach databases and SmartSuite 2.0 or later. Century Pack: Programming Languages covers Basic, Visual Basic, C and Visual C++ (including attributes, calculations and functions). DateReporter provides a table-based scan for other desktop databases, including Clipper, dBase and Paradox. The four packs are priced at \$6,000 per concurrent user on a Windows 95 or Windows NT workstation; there is no restriction on the number of machines whose files or applications are analyzed. For more information, contact IST Development at 617 988-6251 or visit www.istinfo.com.

Adding Workflow to the Call Center

SO WHAT DO YOU DO WITH ALL THE DATA that flows into your enterprise call center? Somebody's got to act on it sometime. Mosaix Inc., developer of customer-relationship and call management software, has created a call center-specific version of its **ViewStar 5.0** customer-relationship software. ViewStar 5.0 Call Center Edition combines workflow, computer-telephony integration and call center requirements to improve call center efficiency and customer retention. It is designed to automate the customer-agent interaction and to create a workflow process for fulfillment of customer requests.

The software lets agents view real-time updates on the status of individual accounts, so that customer inquiries can be handled quickly and with a minimum of transfers. It also lets companies coordinate customer interactions between the phone, fax, e-mail and the Internet. It includes a graphical process-modeling tool for mapping customer interaction and fulfillment, which lets managers define wait queues, integration with interactive voice response (IVR) systems, screen pops, access to legacy data and other computer-telephony integration functions. They can also define scenarios for routing correspondence and other work not involving the telephone during off-peak calling periods.

ViewStar 5.0 Call Center Edition starts at \$5,500 per seat for a 100-user license. For more information, contact Mosaix at 510 337-2000 or visit www.mosaix.com.

widely varying traffic loads, which means that video traffic is much less likely to disrupt other forms of communication. Unfortunately, ATM to the desktop is still quite expensive compared with Ethernet, and a minority of corporate LANs adhere to ATM standards.

ATM is not, however, an absolute prerequisite. "Switched Ethernet will permit VOD, and that's what most of our customers use," says Jack Battersby, president of Digital Media Solutions Inc., a North Easton, Mass.-based Web site developer specializing in the integration of the Web with databases and VOD.

Users need a dedicated server for VOD as well, capable of handling multiple simultaneous streams. Prices vary enormously, with N-Cube servers capable of outputting as many as 20,000 simultaneous streams priced in the hundreds of thousands of dollars and the smallest SGI servers priced at \$12,000. Software to execute the video streaming function and provide control of the stream at the desktop is another expense. The VOD packages from Oracle and IBM permit VCR-like functionality at the desktop with pause, advance and timing selection.

The hardest task falls to the network administrator because real-time video imposes a host of demands on the network. This is getting easier, though. Greene notes that 3Com's SGI servers incorporate an Informix Software Inc. relational database "that allows for easy categorization of content and even assignment of specific bit rates according to need."

Director of Network Operations Ron Tuthill, who set up the New York Jets' system, and UT's Smith handled much of the system installations themselves. Tuthill notes, "If it's not an off-the-shelf solution, then it gives you a competitive advantage. A lot of our competitors would like to know how we did what we did. They'll just have to learn it on their own."

Greene insists that IS will soon be doing just that. "Ultimately it will be the cheapest way to distribute video materials in an organization," he says. "I see the day when VOD will be at every desktop in every large organization."

Smith adds that seasoned network administrators have nothing to fear from the process of putting video on the network. "When all is said and done, it's harder to produce the original video of educational materials than it is to distribute the finished product," he says. "Video-on-demand takes planning, but it's not as difficult as people think." 

Dan Sweeney is a technology writer based in Burbank, Calif. He can be reached at dswee34359@aol.com.



**Are you planning to move your messaging
onto a single platform?
Put down that crowbar and let's talk.**

Unify.

There are a lot of solid arguments for putting everyone and everything onto one messaging platform. A company can't communicate when its e-mail systems spew gibberish at each other. A lot of older systems only know how to send e-mail. It's tough to manage umpteen different systems and directories. And the sheer volume of messages can slow e-mail to a crawl. Unifying your messaging platforms can solve these problems.

But you know what moving to a single platform can mean:

Alternative one: Yank everything out by the roots, data and all. Rebuild your entire communications infrastructure. Spend a year living in the crawl space. Your basic IT nightmare.

Alternative two: Microsoft® Exchange Server.

With Exchange, you can forget about starting from scratch. Instead, think about interoperability and integration. Take the messaging systems that got you here and migrate your users and data onto a unified platform. You can do it right now.

Microsoft Exchange Server connects to the messaging and collaboration systems your company already has. It comes with built-in connectors to Lotus Notes, cc:Mail, Microsoft Mail and mainframe messaging. Wizards help walk you through the process of migrating your systems onto Exchange. It supports every standard Internet protocol. And Exchange connects the widest range of devices, from palmtops to high-end workstations, from 16- and 32-bit PCs to PowerMacs.

With Exchange, you connect all of your users, wherever they are, whether you have 80 employees or 80,000. There is simply no limit, because Exchange has unlimited message-store capabilities. With its tight integration with Windows NT® Server, Exchange can keep your critical communications running 24/7/365. And with the heightened security of Windows NT, your company's messages remain private.

Along with interoperability and integration, Exchange cranks up every aspect of corporate communication and collaboration. It comes with the Microsoft Outlook™ 98 client, so users and groups can take control of their days with desktops full of calendaring, contact and task management tools. Exchange merges with Microsoft Office, so users can create work, exchange work, collaborate on work. And by connecting everyone and everything, Microsoft Exchange Server becomes the core of your company's Digital_Nervous_System.

Microsoft Exchange Server is the all-inclusive platform that unifies your company's messaging. So get everyone and everything working on the same page without all the rubble.

Where do you want to go today?®

Microsoft®

www.microsoft.com/exchange/evaluation/

First Person

A VIEW FROM THE FRONT LINES

Moving Lessons

A former CIO looks back at life during a corporate relocation

BY ALBERT E. DIETRICH III

CORPORATIONS MOVE THEIR headquarters for a variety of reasons. They might be looking for a larger talent pool, better financial resources, more convenient access to customers or improved logistics. But in addition to bringing benefits, a move also

causes complications. The infrastructure must be disassembled and rebuilt, employees and their families have to pick up and move (or decide not to), and the company will have to hire and retrain employees at the new location. All too often, however, companies don't give enough thought to the com-

plexity of a move, mainly because very few in the organization have ever experienced one.

I was the CIO of a Fortune 500 company that relocated a couple of years ago from a rural community to a large metropolitan area. When I joined the organization, several months before the move was announced, I found a mainframe-oriented IS staff and a stable work environment. Staff turnover was nonexistent and morale was high. The IS budget was small compared with other corporations with similar revenues. No technology decision was made without a thorough analysis. The company was just moving into a LAN environment and to the PC as the standard workstation. I was brought on board to give some leadership to the organization and help make information technology a more vital part of the corporate infrastructure.

The company had just made a new acquisition, and one of my first tasks was to integrate two custom-written corporate systems—a major undertaking for the IS staff. At the time, I had no idea the board and executive management were also planning to move the headquarters. Four months later, I found myself in the midst of a corporate relocation.

For the first time in my 35-year IS career, I experienced the dramatic effect of a relocation announcement. Productivity dropped significantly as employees tried to make the mental adjustment. "Will they ask me to relocate?" "If they do, do I want to go?" "If they don't, what will I do?" "How will this affect my family and friends?" These questions consumed a lot of the employees' time and energy for several months. Work still was accomplished but with far less enthusiasm. Morale declined. Dedicated employees turned against the company and its executives. Even the community reacted negatively. A company that for a generation had been a good neighbor was now evil in the eyes of local authorities, the





NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 36 WEST KINGSTON, RI

POSTAGE WILL BE PAID BY ADDRESSEE

APC[®]

AMERICAN POWER CONVERSION

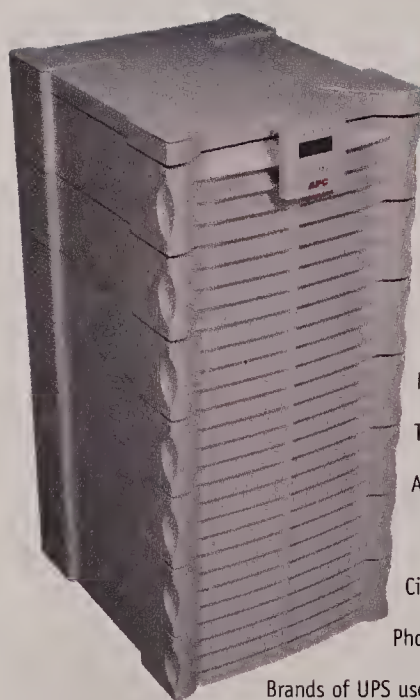
KEY CODE: C936Z

132 FAIRGROUNDS ROAD

PO BOX 278

WEST KINGSTON RI 02892-9920





FREE! Symmetra Video



☐ **YES!** I'd like more information about Symmetra™ Power Array™. Please send me a FREE video.

☐ **NO,** I am not interested in Symmetra at this time. But I would like a FREE Power Protection Handbook.

Name: _____

Title: _____ Company: _____

Address: _____

City: _____ State: _____ Zip: _____ Ctry: _____

Phone: _____ Fax: _____

Brands of UPS used: _____ #: _____

Brand of PCs used: _____ #: _____

Brands of Servers used: _____ #: _____

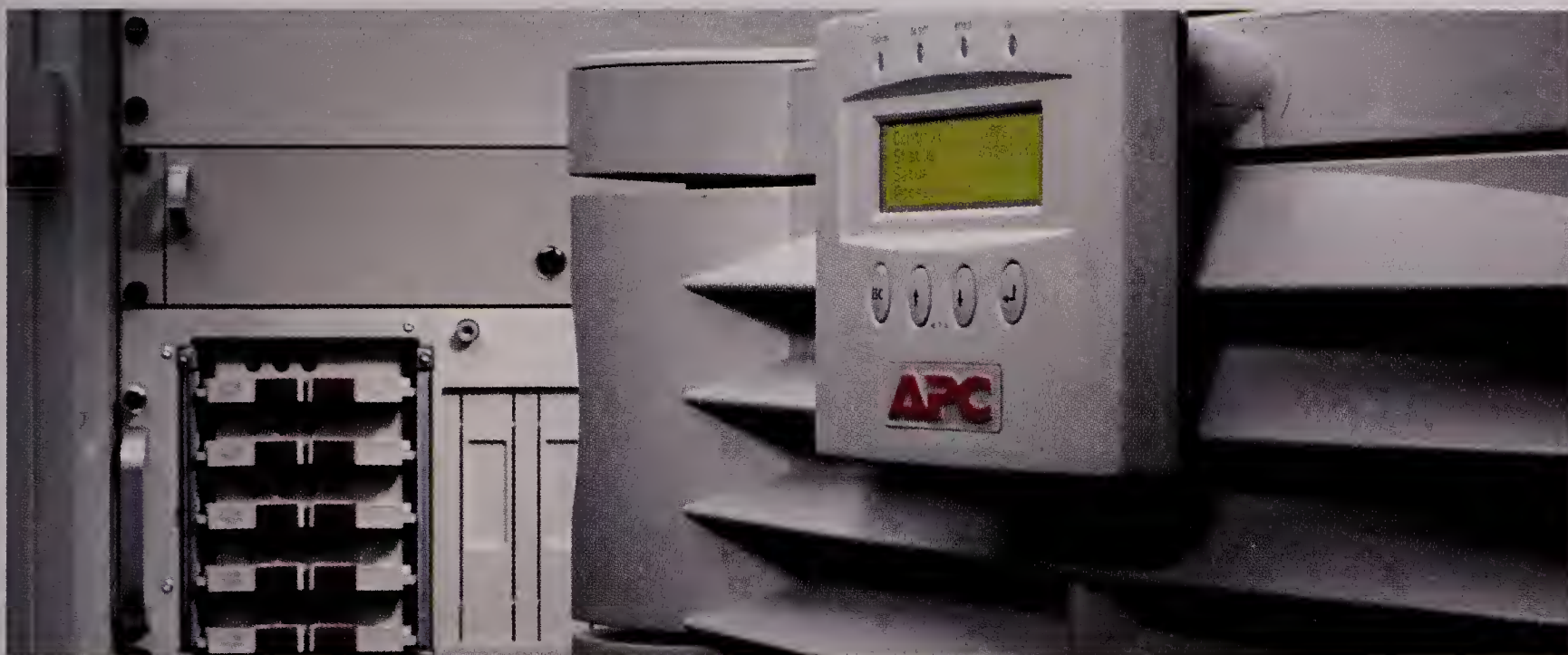
* Allow 6 - 8 weeks for delivery.

Please fill in all information completely for prompt service.



<http://promo.apcc.com> KEY CODE C936Z
(888) 289-APCC x1103 • FAX: (401) 788-2797

In 2 minutes you can add capacity for 20 new servers, 2 hours of runtime, or twice the fault-tolerance...



Introducing New Symmetra™ Power Array™ from APC.



If you've ever installed a 6-20kVA, non-redundant, legacy UPS system in a datacenter, you know the challenges: installation is a struggle, maintenance is a challenge, power upgrades are unheard of, and hardware tends to be unreliable. In fact, most legacy UPSs were designed for electrical and manufacturing applications and not with the needs of today's sensitive datacenters in mind. Worst of all, with a single point of failure, the legacy system is all too interruptible.

With power problems causing nearly half of all network downtime, the fastest and easiest way to increase network availability is to increase power availability. Now, APC's Symmetra™ Power Array™, a revolutionary power protection system, provides the high availability, flexibility, reliability, ease of installation and simple upkeep you need – all without breaking your back or the bank. Best of all, Power Array redundancy and manageability deliver uninterrupted peace of mind.

N+1 Redundancy: Symmetra Power Modules share the attached load evenly. If one module is removed or fails, the other modules seamlessly and instantaneously pick up the rest of the load. N+1 redundancy is used today in disk arrays (RAID), in processor power supplies, and in processors themselves. Symmetra Power Array brings redundancy to server power protection for the first time.

Scalable Power: Symmetra Power Array can be configured for 4-16kVA, enough for mid-sized computer rooms. Incremental 4kVA Power Modules expand UPS voltage load capacity to match datacenter demands.

Scalable Runtime: Additional Battery Modules, which may be shifted from one Power Array to another, or added in Extended-run Battery Frames, can provide virtually unlimited runtime. If you need to solve the problem of network downtime once and for all, install a Power Array with redundancy and fault-tolerance to match your server and storage. Call APC today for your FREE Enterprise Solutions Kit.

Add Redundancy and Fault-tolerance

True N+1 Redundancy ensures maximum uptime and high systems availability. In a Power Array, battery, power and intelligence modules are all redundant, providing total power reliability for your network.



Add Capacity/Runtime

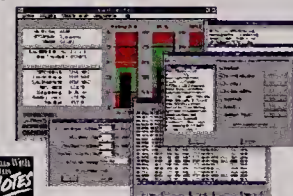
Protect your investment with redundant, modular power modules: Scalable kVA and runtime ensure that Symmetra will meet your power needs now and in the future.

Simplify Maintenance

Symmetra's service-friendly design cuts the cost and complexity of maintenance. Batteries, intelligence modules and power modules are user-replaceable and hot-swappable.

Integrate Advanced Management

Symmetra power array provides the ability to manage your network or datacenter power from anywhere in the world with PowerChute® plus management software. Whether you use a Web-based or LAN/SNMP-based management platform, APC software and accessories integrate with your existing management solution.



FREE! Symmetra Video

on invaluable set of tools to help plan your datacenter power protection, including the Gortner Group report, "Uninterrupted Power Supply Systems in a Distributed Computing Environment". Just go to

<http://promo.apcc.com> KEY CODE C936Z

or E-mail datacenter@apcc.com and get your **FREE** kit today!



(888) 289-APCC x1103 • FAX: (401) 788-2797

Installing or reconfiguring your modular Power Array couldn't be any simpler.



©1998 APC. All Trademarks are the property of their owners. SY1A8EF-US

(800)347-FAXX PowerFax

E-mail: datacenter@apcc.com

132 Fairgrounds Road, West Kingston, RI 02892 USA

APC has won more awards for reliability than all other UPS vendors combined.



First Person

media and the citizens.

Weeks after the relocation decision, the company announced who would be asked to move. Another round of frustration and anger began for those who were not selected. Of those not offered relocation, some were offered a retirement incentive while others were given generous severance packages and bonuses to remain with the corporation until the relocation was accomplished. However, many of the most valuable employees, both those who were asked to move and those who were not, went looking for jobs and the opportunity to leave the company as soon as possible. The bonuses were insufficient incentive to counter their insecurity.

During this time, company executives developed plans to change the technology infrastructure, procure furniture and equipment for the new headquarters, and generally support the business during the transition. They based their plans on the assumption that the employees who had been asked to relocate would accept. But only one-sixth of the employees chose to relocate, though more than half had been asked to do so. For IS, this was devastating. Not only did we have to support the existing systems and infrastructure, but we also had to build a new infrastructure with less than half the needed staff. And

Our salary scale was far below what the new location's market demanded. We began to lose employees who had relocated, and we couldn't keep the new people we had hired.

every staff member had the additional problem of moving his or her family and finding a new home.

Executive management wanted to speed the moving process because of the community reaction, employee morale issues and staff resignations, so they scheduled a four-month relocation, two months shorter than originally planned.

Our new location wouldn't be ready in time, so we moved into three temporary locations, each of which had to be wired to support phones and computing equipment. The company bought PCs, printers and phones that we had to configure and install with the understanding that

everything would have to be replaced and redone when we moved into our permanent quarters.

Rebuilding the IS staff was difficult. In our new metropolitan setting, we expected to find a larger selection of technical resources than we'd had in the rural location. What we found was a very tight, competitive market for good technical people. Our salary scale was far below what the new location's market demanded. We began to lose employees who had relocated, and we couldn't keep the new people we had hired. Our turnover rate the first year was about 30 percent. Finally, we increased the base salaries for all of the staff and began to give special bonuses to the newly hired employees.

With much of the staff in a learning mode, IS was under a great deal of pressure. We hired outside resources to help. The company had a mainframe with a terminal access environment prior to the move. We needed a more flexible infrastructure to support our growth and integrate our businesses, so we selected a token ring LAN architecture and outsourced our frame relay data network and our voice network. The transition of our mainframes to the outsourcer was problematic. As we integrated the acquired businesses, our systems became larger and more complex. Unfortunately, our outsourcer was not equipped to handle a company of our size and was basically learning along with us. The outsourcer also gave us less support than we needed and required more assistance than we'd thought. In hindsight, we should have spelled out more clearly what we expected from the outsourcing company.

In addition, building the network, servers and gateways and teaching users were far larger tasks than we had antic-

ipated. The new network was unstable and response time was poor, which gave users an excuse to blame *all* problems on IS, even though many of the issues were training- and data-related.

It took us about a year after the relocation was completed to stabilize the

The outsourcer gave us less support than we needed and required more assistance than we'd thought.

environment. Unfortunately, this was longer than the executive managers wanted or expected, and they focused a great deal of their dissatisfaction on IS.

Also, during this transition, the corporation made more acquisitions. IS needed more resources and money, and new businesses had to be integrated much faster if we were going to benefit from the acquisitions. The senior managers felt existing management couldn't achieve that, and I was replaced.

In retrospect, I have had some thoughts about what lessons were learned during the relocation and what the company and I might have done differently. The company could have planned the relocation better and should not have reorganized simultaneously. It should have integrated the new acquisitions differently, perhaps waiting until the move was completed, and it should have provided better support in building the new staff. I could have more accurately set expectations of the cost, time and resources needed to relocate and rebuild the infrastructure. I should not have outsourced our mainframe systems during the relocation.

The job of CIO is, at best, a difficult one. Add to that the task of relocating the business and the difficulty level rises significantly. I like to compare the job of a CIO during the reconstruction of a company with the pioneer who went into the new, unexplored territory and risked life and limb to provide a place for the settlers to follow. Many of those dedicated, hard-working pioneers never survived. So it is with CIOs. **CIO**

Albert E. Dietrich III is a consultant based in Dallas. He can be reached at aldietrich@worldnet.att.net.

HAVE YOU VISITED CIO.COM LATELY?

WHERE THE PAGES END... THE INTERACTIVITY BEGINS.

ASK THE EXPERT

After You
Read,
Find Out
More.



This new Web site feature allows you to email questions, based on a particular article or topic, to a guest expert. All past questions and answers are archived at the site for review.

- ▶ June 15 – June 30: Tom Lesica, VP of IT, Pepsi-Cola North America on IT in Emerging Markets
- ▶ July 15 – July 31: Leonard Fuld, President, Fuld & Co. on Competitive Intelligence

Visit www.cio.com/CIO/expert to pose your questions.

CIO RADIO

Listen
&
Learn

Tune into the “radio station” designed especially for busy IT and business executives. Every week, CIO.COM webcasts a new interview with a notable, quotable expert on the critical IT issues. Past guests include:

- ▶ Stephen Roach – Year 2000 Impact on the Economy
- ▶ Leonard Fuld – Competitive Intelligence
- ▶ Larry Prusak – Knowledge Management
- ▶ Ira Magaziner – E-Commerce & Government Policy

Set your bookmark to www.cio.com/radio and catch all the future programming.





INDEX

Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

3Com Corp.	72
Allegheny Power	56
Applied Technical Systems Inc.	41
A&R Partners	41
Arthur Andersen	86
Autonomy Inc.	41
Baan Co., The	52
Barclays Bank PLC	41
Boeing Co., The	41
British Telecommunications PLC	20
Centrax Corp.	72
Chasm Group, The	52
Cisco Systems Inc.	52
Compaq Computer Corp.	52
Computer Motion Inc.	20
Concurrent Technologies Corp.	72
Congressional Quarterly Inc.	20
Congressional Research Service	20
Dataquest	64
Dell Computer Corp.	52
Digital Media Solutions Inc.	72
Ensure Technologies Inc.	72
Ernst & Young LLP	32
E-Stamp Corp.	20
Gartner Group Inc.	56, 64
Georgia-Pacific Corp.	56
GTE Internetworking	32
Hapco Farms Inc.	64
Harlequin Group PLC	41
Hartness International	64
Healthway Interactive Inc.	72
Heineken NV	64
Hewlett-Packard Co.	52
IBM Corp.	52, 72
Informix Software Inc.	72
Intel Corp.	52, 64
Intelitrac Technologies Inc.	72
InterStar Systems Inc.	64
IST Development Inc.	72
J.D. Edwards & Co.	52
Lawson Software	52
Legi-Slate Inc.	20
Lucent Technologies Inc.	41
MapInfo Corp.	41
Maxell Corp. of America	72
Medical Education Technologies Inc.	20
Microsoft Corp.	38, 52, 64, 72, 86
Mosaix Inc.	72
Motorola Inc.	52
N-Cube	72
Neurodynamics Ltd.	41
New York Jets Football Club	72
Novell Inc.	52
Omega Engineering Inc.	32
Oracle Corp.	52, 72
Ouellette & Associates Consulting Inc.	56
Pacific Northwest National Laboratory	41
PeopleSoft Inc.	52
Perspecta Inc.	41
PictureTalk Inc.	38
Pioneer Natural Resources	86
Powersim Corp.	86

QAD Inc.	52
RFIDeas Inc.	72
Sabre Group, The	41
SAP AG	52
SCS Corp.	72
SeaChange International Inc.	72
Seiko Instruments Inc.	20
Shell International Petroleum Co.	41
Silicon Graphics Inc.	72
South African Breweries Ltd., The	64
Sterling Bank	64
Sun Microsystems Inc.	72
Symix Systems Inc.	52
Time New Media Inc.	41
Tivoli Systems Inc.	72
Visionics Corp.	72
Visual Insights	41
Wal-Mart Stores Inc.	52
Washington Post Co., The	20

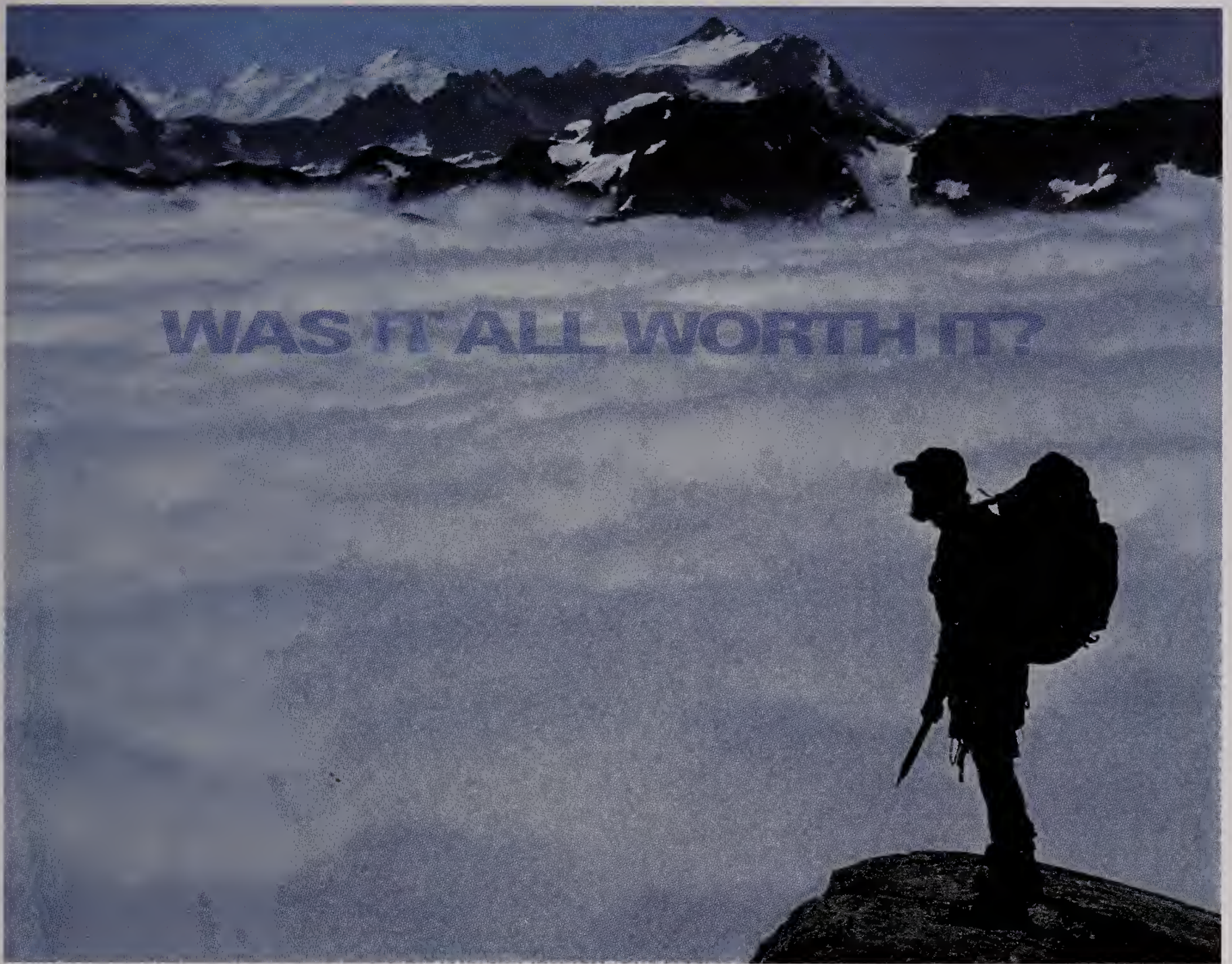
Advertiser Index

*Denotes Section 2 Advertisers

Adante	53*
AIIM	57*
Amdahl Corp.	21
American Power Conversion	81
Attachmate Corp.	23*
Bell Atlantic Corp.	83
BMC Software	13*
Business Objects Inc.	45*
Candle Corp.	20*
CCD Online Systems Inc.	17*
Centrax Corp.	77*
CIO Communications Inc.	C3*, 40, 66A*, 67*, 83
Commercepath	79*
Compaq Computer Corp.	C2*
Compaq/MicroAge	29*
Computer Associates Intl. Inc.	C4, C4*, 5, 50
Comshare Inc.	33*
Data General Corp.	9*
Dell Computer Corp.	C2
DLTape Systems	54
Dow Jones & Co. Inc.	33
Dun & Bradstreet Software	85
Exabyte Corp.	15*, 46*, 61
Gateway 2000 Inc.	10
Hewlett-Packard Co.	18, 30, 68, 74
Hyperion Software	81*
IBM Corp.	24, 42, 55*
Information Builders Inc.	5*
Inprise	65*
J.D. Edwards & Co.	42*
LCI International	59*
Lexmark Corp.	31*
Lotus Development Corp.	10*
Lucent Technologies Inc.	17, 87
Microsoft Corp.	2, 78
Network Associates	6, 48*
Novell Inc.	60*, 62
Oracle Corp.	9
PeopleSoft Inc.	6*
Platinum Technology Inc.	88
Quintus	49
Remedy Corp.	39*
SAS Institute Inc.	23
Seagate Software	69*
Secure Computing Corp.	19*
Sensormatic Electronics Inc.	73*
Siebel Systems	41*
Silicon Graphics Inc.	70
Sprint	27
Sun Microsystems Inc.	15, 29
Tibco	37
Unisys Corp.	13
US Data	25*, 27*
Veritas Software	75*
Viasoft Inc.	35
Wang Laboratories Inc.	37*

CIO is a publication of International Data Group, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. International Data Group publishes over 275 computer publications in over 75 countries. Sixty million people read one or more International Data Group publications each month. International Data Group's publications include: **Argentina:** Buyer's Guide, Computerworld Argentina, PC World Argentina; **Australia:** Australian Macworld, Australian PC World, Australian Reseller News, Computerworld, IT Casebook, Network World, Publish, Webmaster; **Austria:** Computerwelt Österreich, Networks Austria, PC Tip Austria; **Bangladesh:** PC World Bangladesh; **Belarus:** PC World Belarus; **Belgium:** Data News; **Brazil:** Anuário de Informática, Computerworld, Connections, Macworld, PC Player, PC World, Publish, Reseller News, Supergamepower; **Bulgaria:** Computerworld Bulgaria, Network World Bulgaria, PC & MacWorld Bulgaria; **Canada:** CIO Canada, Client/Server World, ComputerWorld Canada, InfoWorld Canada, NetworkWorld Canada, WebWorld; **Chile:** Computerworld Chile, PC World Chile; **Colombia:** Computerworld Colombia, PC World Colombia; **Costa Rica:** PC World Centro America; **The Czech and Slovak Republics:** Computerworld Czechoslovakia, Macworld Czech Republic, PC World Czechoslovakia; **Denmark:** Communications World Danmark, Computerworld Danmark, Macworld Danmark, PC World Danmark, Techworld Denmark; **Dominican Republic:** PC World Republica Dominicana; **Ecuador:** PC World Ecuador; **Egypt:** Computerworld Middle East, PC World Middle East; **El Salvador:** PC World Centro America; **Finland:** MikroPC, Tietoverkko, Tietoviikko; **France:** Distributique, Hebdo, Info PC, Le Monde Informatique, Macworld, Reseaux & Telecoms, WebMaster France; **Germany:** Computer Partner, Computerwoche, Computerwoche Extra, Computerwoche FOCUS, Global Online, Macwelt, PC Welt; **Greece:** Amiga Computing, GamePro Greece, Multimedia World; **Guatemala:** PC World Centro America; **Honduras:** PC World Centro America; **Hong Kong:** Computerworld Hong Kong, PC World Hong Kong, Publish in Asia; **Hungary:** ABCD CD-ROM, Computerworld Szamitastechnika, Internetto Online Magazine, PC World Hungary, PC-X Magazin Hungary; **Iceland:** Tolvheimur PC World Island; **India:** Information Communications World, Information Systems Computerworld, PC World India, Publish in Asia; **Indonesia:** InfoKomputer PC World, Komputek Computerworld, Publish in Asia; **Ireland:** ComputerScope, PC Live!; **Israel:** Macworld Israel, People & Computers/Computerworld; **Italy:** Computerworld Italia, Macworld Italia, Networking Italia, PC World Italia; **Japan:** DTP World, Macworld Japan, Nikkei Personal Computing, OS/2 World Japan, SunWorld Japan, Windows NT World, Windows World Japan; **Kenya:** PC World East African; **Korea:** Hi-Tech Information, Macworld Korea, PC World Korea; **Macedonia:** PC World Macedonia; **Malaysia:** Computerworld Malaysia, PC World Malaysia, Publish in Asia; **Malta:** PC World Malta; **Mexico:** Computerworld Mexico, PC World Mexico; **Myanmar:** PC World Myanmar; **Netherlands:** Computer! Totaal, LAN Internetworking Magazine, LAN World Buyers Guide, Net, Macworld Netherlands, WebWereld; **New Zealand:** Absolute Beginners Guide and Plain & Simple Series, Computer Buyer, Computer Industry Directory, Computerworld New Zealand, MTB, Network World, PC World New Zealand; **Nicaragua:** PC World Centro America; **Norway:** Computerworld Norge, CW Rapport, Datamagasinet, Finansial Rapport, Kursguide Norge, Macworld Norge, Multimediaworld World Norway, PC World Ekspress Norge, PC World Nettverk, PC World Norge, PC World ProduktGuide Norge; **Pakistan:** Computerworld Pakistan; **Panama:** PC World Panama; **People's Republic of China:** China Computer Users, China Computerworld, China InfoWorld, China Telecom World Weekly, Computer & Communication, Electronic Design China, Electronics Today, Electronics Weekly, Game Software, PC World China, Popular Computer Week, Software Weekly, Software World, Telecom World; **Peru:** Computerworld Peru, PC World Profesional Peru, PC World SoHo Peru; **Philippines:** Click!, Computerworld Philippines, PC World Philippines, Publish in Asia; **Poland:** Computerworld Poland, Computerworld Special Report Poland, Cyber, Macworld Poland, Network World Poland, PC World Komputer; **Portugal:** Cerebro/PC World, Computerworld/Correio Informático, Dealer World Portugal, MacIn/PCIn Portugal, Multimedia World; **Puerto Rico:** PC World Puerto Rico; **Romania:** Computerworld Romania, PC World Romania, Telecom Romania; **Russia:** Computerworld Russia, Mir PK, Publish, Seti; **Singapore:** Computerworld Singapore, PC World Singapore, Publish in Asia; **Slovenia:** Monitor; **South Africa:** Computing SA, Network World SA, Software World SA; **Spain:** Comunicaciones World España, Computerworld España, Dealer World España, Macworld España, PC World España; **Sri Lanka:** Infolink PC World; **Sweden:** CAP&Design, Computer Sweden, Corporate Computing Sweden, Internetworld Sweden, it.branschen, Macworld Sweden, MaxiData Sweden, MikroDatorn, Nätverk & Kommunikation, PC World Sweden, PC/Aktiv, Windows World Sweden; **Switzerland:** Computerworld Schweiz, Macworld Schweiz, Pctip; **Taiwan:** Computerworld Taiwan, Macworld Taiwan, NEW VISION/Publish, PC World Taiwan, Windows World Taiwan; **Thailand:** Publish in Asia, Thai Computerworld; **Turkey:** Computerworld Türkiye, Macworld Türkiye, Network World Türkiye, PC World Türkiye; **Ukraine:** Computerworld Kiev, Multimedia World Ukraine, PC World Ukraine; **United Kingdom:** Acorn User UK, Amiga Action UK, Amiga Computing UK, Apple Talk UK, Computing, Macworld, Parents and Computers UK, PC Advisor, PC Home, PSX Pro, The WEB; **United States:** Cable in the Classroom, CIO Magazine, Computerworld, DOS World, Federal Computer Week, GamePro Magazine, InfoWorld, I-Way, Macworld, Network World, PC Games, PC World, Publish, Video Event, and THE WEB Magazine; online webzines JavaWorld, NetscapeWorld, and SunWorld Online; **Uruguay:** InfoWorld Uruguay; **Venezuela:** Computerworld Venezuela, PC World Venezuela; and **Vietnam:** PC World Vietnam.

Editorial, Advertising and Business Offices: 492 Old Connecticut Path, P.O. Box 9208, Framingham, Massachusetts 01701-9208, (508) 872-0080. **Postal Information:** CIO (ISSN 0894-9301) is published in two sections, semimonthly; and as a combined issue December 15/January 1 by CIO Communications Inc., 492 Old Connecticut Path, P.O. Box 9208, Framingham, Massachusetts 01701-9208. Periodicals postage paid at Framingham, MA, and at additional mailing offices. **Reprints:** Copyright 1998 by CIO Communications Inc. All rights reserved. Reproduction of material appearing in CIO is forbidden without written permission. Send all reprint requests to Permissions Department, CIO, 492 Old Connecticut Path, P.O. Box 9208, Framingham, Massachusetts 01701-9208. **Photocopy Rights:** Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CIO for users through the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus \$.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Massachusetts 01970. Please specify: ISSN 0894-9301. Permission to photocopy does not extend to contributed articles followed by this symbol: ‡. **Subscriptions:** Address inquiries to CIO, 492 Old Connecticut Path, P.O. Box 9208, Framingham, Massachusetts 01701-9208; 800 788-4605. CIO is free to qualified information executives. To all others the one-year basic rate is \$89 for U.S. and Canada, \$125 to foreign countries (payable in U.S. funds only). The single copy price is \$8. Please allow 4 to 6 weeks for new subscriptions to begin. **Change of Address:** Please fax a copy of current subscription label along with new address to (508) 879-7899. Allow 4 to 6 weeks for change to take effect. **Postmaster:** Send change of address to CIO, P.O. Box 489, Northbrook, Illinois 60065-9816.



Maximize your information technology with D&B as your guide.

"With all this technology, why aren't we more profitable?" is surely one of today's most pressing business questions. You can invest in hardware, software and networks, but if your data isn't clean, well-organized and easily accessible, you can't possibly get maximum value from your investment.

Data integration is the key, and Dun & Bradstreet is the source. Whether you're assessing risk, evaluating business relationships, or seeking market opportunities across the globe, we can help. We'll enhance your data with value-added information on 49 million businesses worldwide. Help you integrate information from multiple sources within your company. And assist in cleaning your databases in preparation for loading into your system. We can also provide consulting services and analytic tools to help you transform information into action.

To request a data integration information kit or receive a free consultation with a D&B information specialist, just call 1-800-350-3867, ext. 3100. Or visit us at www.dnb.com

What emerges is a powerful business tool: one central source of fresh, vital information that helps you make solid, insightful business decisions quickly and confidently.

Your technology is vital to the success of your business, but it's only as good as the data within it. When Dun & Bradstreet helps you integrate that data, everything from your decision-support systems to your data warehouses becomes more valuable.

"Was it all worth it?" is a common question. With D&B to help you maximize the value of your information technology, the answer will certainly be a resounding "Yes."



Dun & Bradstreet

The insight to grow your business.

Working Smart

MAXIMIZING THE PAYOFF FROM I.T.

AT THE END OF THE MOVIE *War Games*, a supercomputer runs through every geopolitical scenario for nuclear war before concluding there is no way to win such a conflict. It sure would be nice to have something like that to calculate the ramifications and cost-effectiveness of potential business decisions.

In the oil and gas industry, cause and effect is easy to track, acknowledges Charles Wetzel, director of business reengineering at Pioneer Natural Resources (PNR) in Las Colinas, Texas. The discovery of oil and gas reserves drives production, which drives revenues. Revenues are then reinvested for exploration.

What's not easy to get a handle on is the variables associated with the entire process of running an energy company, such as development and production costs and the ratio of gas and oil in a field. Most of the time, says Wetzel, "you learn from the school of hard knocks."

Like a true Texas maverick, Wetzel sought some out-of-the-box thinking to streamline the process. Starting in 1995, Wetzel and a group of PNR executives began to identify all the possible management variables that come into play in an energy company. They ultimately listed about 150, ranging from quantitative numbers like the price of oil to "softer, more societal" variables such as how employee morale affects production.

Then Wetzel and his group built a causal loop diagram—a representation of every business process in the company. The question was how to model those variables to determine the impact on the business when one or more of them was adjusted. Wetzel hired a group of consultants to help

Pioneer Natural Resources' Simulation Technology

Vital Statistics:

- **Organization:** Pioneer Natural Resources, Las Colinas, Texas
- **Application:** Scenario planning and analysis simulation technology
- **Technologies:** Powersim Corp.'s Powersim; Microsoft Corp.'s Microsoft Excel and Microsoft Access; Windows-based PCs
- **Scope:** 20 people in five divisions
- **Sponsor:** Charles Wetzel, director of business reengineering
- **Objective:** Enable financial, engineering and exploration managers to perform what-if simulation to test the variables associated with managing their business operations
- **Payoff:** Ability to analyze different courses of action could increase revenues by 25 to 40 percent

find an answer and was impressed with a prototype Arthur Andersen built using Powersim, a simulation-development tool, from Powersim Corp. in Herndon, Va.

The Powersim prototype also intrigued PNR executives when it was delivered in 1997. To test the technology, the executives used the prototype to simulate PNR's volatile Gulf Coast division, in which the typical production time line is very long. While the Gulf Coast simulation sold the executives on the technology, PNR currently doesn't utilize Powersim for such functionality. With Powersim installed on a Windows-based PC, and using Microsoft Corp.'s Microsoft Excel and Microsoft Access for the input and output of business variables, PNR execu-

tives now use the technology to create a model for scenario planning and what-if analyses.

The simulation model demonstrated the benefit of bringing a well into production sooner than executives might previously have thought was financially feasible. By modeling different scenarios with Powersim, the executives could determine how much to pay a service company for completing work faster and yet still earn a profit. "That's just

one example of the type of corporate intuition that we hope to gain," notes Wetzel, adding that "the engineers jumped on it like a chicken on a June bug."

Pending an internal reorganization, Wetzel eventually plans to implement the technology in all five PNR divisions, developing a specialized version for each division's business drivers. Although he doesn't have any dollar figures yet, Wetzel hypothesizes that a division with an annual capital budget between \$75 million and \$80 million could potentially boost its

revenues by 25 to 40 percent based on the ability to tinker with business variables and create numerous scenarios. Hard dollars notwithstanding, however, Wetzel says the real value of the simulation technology is its ability to determine the specific actions necessary to arrive at a desired business result or to model the result of a business decision under consideration. "There's value in controlling the future as opposed to just living with the results," he says, insisting that the use of simulation technology at PNR is intended to augment strategic planning, not replace it.

Senior Editor Howard Baldwin can be reached at hbaldwin@cio.com. Send Working Smart ideas to Features Editor Megan Santosus at santosus@cio.com.

WHAT'S IT GOING
TO TAKE TO GET
A DATA NETWORK
AS RELIABLE
AS THE VOICE
NETWORK?

©1998 Lucent Technologies

INTELLIGENCE

Every day, the need becomes more critical. Your data network has got to work. No matter what. No matter where. (Just like your voice network.) What's it going to take to get that kind of reliability? For 128 years, we've built the most reliable networks on earth. And we bring that same level of reliability to data. We're building data networking products with self-diagnostic software. They monitor themselves. They fix themselves. We're also making most critical components redundant. Just to be smart. We know what the reliable data network of the future looks like. We can make sure that network is yours.

We make the things that make communications work.™

Lucent Technologies
Bell Labs Innovations

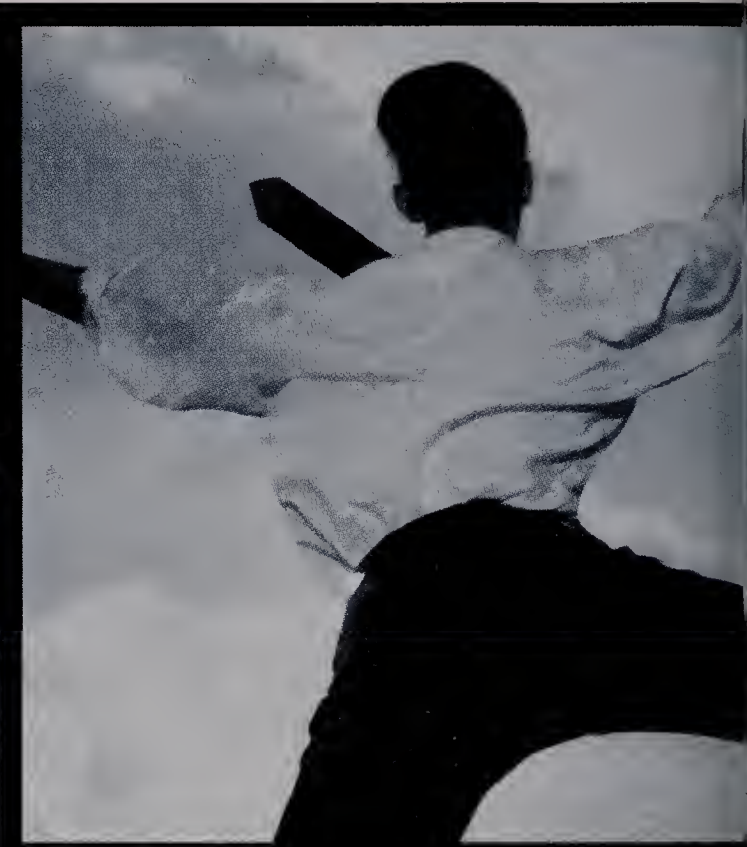
600 Mountain Avenue
Murray Hill, NJ 07974-0636
<http://www.lucent.com>





**Rise to the challenge
of integrating systems
and database management.**

The future is here
and it's called ProVision.
A best-in-class suite that
works with or without
a framework, uniting systems
and database management
to automate and elevate
your entire IT infrastructure.



**Enhance productivity
across the organization.**

Because ProVision isn't
framework-dependent,
neither are you. Configure
and install in weeks, not
years. And every tool in
the suite shares common
data, GUI and configuration
management, so familiarity
with one tool translates
into greater productivity
with any of the others.

Introducing ProVision



Finally, you're free to manage systems and databases together. Free to use best-in-class tools as part of an integrated suite. Free to deploy each tool as needed. And that opens up a new world of opportunity for you, your staff and your business. Find out how at www.platinum.com/provision

Emancipate the enterprise.

The #1 job scheduler. The industry-leading performance management suite. The #1 database reorganization tool. All ready and waiting to free DBAs from the confines of their consoles, let directors finally see things from their point of view and enable IT staff to collaborate with best-in-class tools that interoperate to solve business problems better and faster.

make **IT** shine™

d a t a • s y s t e m s • a p p s

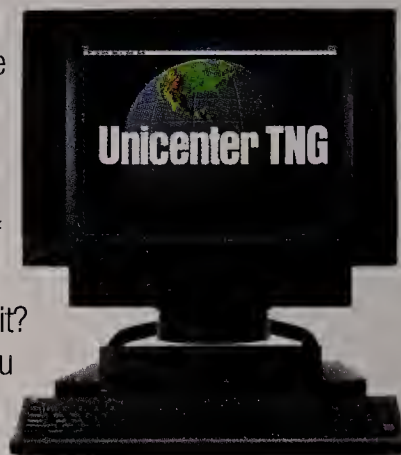
PLATINUM
TECHNOLOGY

Your Choice.

Features	Unicenter	IBM/Tivoli TME 10
Business Process Views™	✓	
Real World Interface	✓	
Fully Integrated Management Functions	✓	
Fully Integrated Network Management	✓	
Policy-Based Management for All Functions	✓	
Manages Over 30 Platforms	✓	
Also Manages AIX, AS/400, OpenVMS, and MVS	✓	
Open and Interoperable	✓	✓
Published APIs for Over 14 Management Functions	✓	
Object-Oriented Enterprise Management Schema	✓	
Intelligent, Autonomous, and Lightweight Agents	✓	
Built-In Security	✓	
Single Sign-On	✓	
Network Security Including the Internet and Intranets	✓	
Monitoring and Event Management	✓	✓
Support for SNMP and HMMP/HMMS Standards	✓	
Virus Protection	✓	
Desktop-to-Host Storage Management	✓	
Software Delivery	✓	✓
Integrated Service Desk	✓	
Workload Management	✓	
Complete Job Flow Process Visualization	✓	
Extensive Web Server Management	✓	
Output Management	✓	
Resource Accounting	✓	
Integrated Support for MVS Management	✓	
Supports DECnet, TCP/IP, SNA, and, IPX/SPX	✓	
Wizards for Easy Customization	✓	

This simple chart only begins to explain the enormous difference between Unicenter® and IBM/Tivoli TME 10.

What clients want today are complete solutions not just software initiatives like SAA, OfficeVision and SystemView. The questions are, do you want to bet your career on IBM's view of the future? Can you afford to wait? And how can you have confidence in a solution that is so IBM-centric and biased?



Those are just a few reasons why thousands of clients prefer Unicenter. It's the industry standard for network and systems management. Today, more than 93% of the Fortune 500 and thousands of small to medium-size businesses trust CA for enterprise management.

Unicentered

Unlike TME 10, Unicenter® TNG™ supports every major hardware platform and operating system. It's open, scalable, extensible, and vendor-neutral. And with Unicenter TNG's powerful new features like advanced agent technology and Real World Interface™, Unicenter TNG is light-years ahead of TME 10.

It's real, it's mission-critical, and it's up and running in thousands of sites around the world.

If that sounds good to you, remember, it's your choice.

**Call 1-888-UNICENTER
or visit www.cai.com**

**COMPUTER
ASSOCIATES**
Software superior by design.

Unicenter® TNG™

©1997 Computer Associates International, Inc., Islandia, NY 11788-7000. All other product names referenced herein are trademarks of their respective companies. Information based on publicly available information as of 3/1/97.